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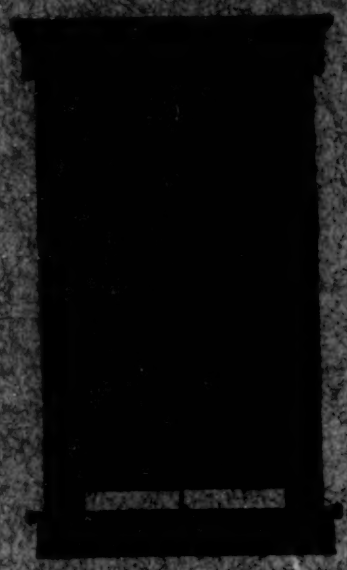

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VOLUME VIII APRIL, 1917 NUMBER 4

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

THE RELATION OF CLASS STANDING TO COLLEGE TESTS

DAGNY SUNNE

H. Sophie Newcomb Memorial College, New Orleans

As an introduction to systematic testing of our students at Newcomb College, a class of seniors and an almost equal group of freshmen were given an information test and 99 of the freshman class tried a series of standard tests in the spring term of 1916. Besides this general purpose the special object of the testing was to compare the achievement of these college girls with the results obtained elsewhere and to correlate the tests with their class grades. It therefore seemed best to use the more common tests already fairly standardized. The class grades are given in the letter system, A, B, C, D, E, F, to the students, but as the professors must make out the marks in per cents, the exact numerical grades were used in the calculations.

A selection was made from the various information tests of the more familiar literary and historical terms and names relating to the past; to these were added an equal number of terms that are being used in newspapers and magazines in connection with current events and names of people most conspicuous at the present time. As there were fifty terms in all, a credit of 2 was given for a correct answer complete enough to be definite, and a credit of one for a partially correct or an indefinite reply. Thus, if "Socrates" was identified merely as a philosopher, credit of 1 was due, if as a Greek philosopher, a credit of 2. Each student was given a typewritten list of the terms and told to write what each signified as definitely as possible. The freshmen numbering 25 and the seniors 32 were tested during a class period and allowed all the time necessary, as no one required more than the period to tell what she knew.

As is shown in Table I, the lowest score of the freshmen was 22, of the seniors 11; while the highest scores were 74 and 94 respectively. But the lowest 20% of the first-year group did better than the corresponding percentile of the seniors. The grades received by these freshmen indicate that they are neither the very best nor the worst of their class, while the senior group included those who received the highest grades in their class and not the lowest grade students. In all subjects that can be compared these seniors received higher marks than the freshmen, not in any course dropping as low as the latter do. On the other hand this group of freshmen have a higher median in class average, English and history than do the freshmen as a class. According to Table II, the coefficients show very low correlations between this information test and the subjects most commonly pursued by the students, as there are negative correlations between the scores in this test and the grades in mathematics and foreign languages, and the highest positive correlation is with history, while the correlation coefficients for the information test and the general average is only .13. For this particular group of students the correlation between mathematics and foreign language gives a coefficient .03, between mathematics and history .90, and between English and history .81. Among the seniors, the student who obtained the highest class average also made the highest score in the information test and the others who had a high rating in the test had class averages above the median. But those who made the lowest scores in the test also average above the median; in fact, the mean of their averages is exactly the same as that of those at the top. Among the freshmen the girl who made the highest score in the information test ranks third in class average. But the mean of the class averages of those at the bottom is again equal to that of the same number who are most conspicuously at the top. This relation is also shown by the fact that the correlation of the information test with the senior class average gives $r = 0$. The highest positive correlation, $r = .36$, is for this test with history of philosophy, and then in order with education, English, history, .29, .25, .24. The correlation between the test and the averages in foreign language is slightly negative. As compared with these coefficients the correlation between history of philosophy and history is .59, philosophy and English .52, and philosophy and foreign language .19.

TABLE I.

Information Test

FRESHMAN GROUP

	Average	English	For. Languages	History	Mathematics	Information	Substitution IV.	Genus Species	Marble Statue	Part-Whole	Cancellation	Opposites
No. of Students	25	25	25	22	21	25	22	22	22	21	22	22
Lowest score	72	70.5	69	65	52	22	24	55	20	65	36	87.5
10%	75.3	72.1	70.3	67.5	56.5	23.3	34	62.5	29	72.5	37	90
20%	78	76	76.5	74	64	27	49	75	43.5	95	40	95
30%	79	79	79.3	75	67	32	56	80	46	95	44	95
40%	82.5	80.7	80.5	76	71	34.5	61	85	50.5	95	48	95
50%	84	81.8	82.1	78.5	75	38	67.3	85	53.6	98.3	50	99.1
60%	85	83.2	83.7	82.3	83.5	41	78	85	55.5	100	54	100
70%	85.6	84.6	86.1	85	87	44	82	95	58.5	100	60	100
80%	87.3	86	88	87.3	89	53.5	89.3	100	64	100	68.6	100
90%	89.5	87.5	94.1	89.6	92	68.6	99.5	100	68	100	86	100
Highest score	91	88	95	90	93	74	100	100	76	100	92	100
25%	76.7	74.3	73.7	71.4	61.4	25.8	43.6	71	38.2	86	39.2	93
50%	82	80.7	80.6	77.7	71.4	35.8	64	85	52.4	96	49.2	98.5
75%	85.6	84.3	85.5	83.4	85.8	44	80.8	94	58.4	100	58.8	100

SENIOR GROUP

	Average	Philosophy	For. Languages	English	History	Education	Information
No. of Students	32	30	18	18	10	20	32
Lowest score	82	78	74.5	80.5	85	80	11
10%	84	80	75.5	80.7	85	80	22.7
20%	85.6	82	85.7	81.5	86	82	33.6
30%	86.6	82.6	87.5	82	86.5	84.5	37
40%	87	83.3	90	84.2	87.5	85.5	40.6
50%	87	85	90.2	87	88	86.5	44
60%	88	86	90.75	88.5	90	89	50
70%	88.3	87.6	91.2	89	90	90	56.6
80%	90	89.7	92	90.2	92.5	91	63.3
90%	92.7	92.3	95.7	92.5	93.5	92	78.8
Highest score	93	94	97	92.5	94	93	94
25%	85.2	81.1	80.6	81.1	85.5	81.6	28.5
50%	87.1	83.8	89.5	84.2	87.7	85.8	40.5
75%	88.5	85.8	90.7	88.5	90	89.8	53

TABLE II.

Correlations

FRESHMEN

No. of Students	Subjects & Tests Correlated	Correlation Coefficients
25	Information test & Av.	r= .13
21	Information test & Math.	r=—.19
22	Information test & Hist.	r= .12
25	Information test & Eng.	r= .07
25	Information test & For. Lang.	r=—.07
22	Inf. test & Subst. IV.	r=—.19
22	Inf. test & Genus-Species	r=—.19
22	Inf. test & Marble Statue	r= .19
21	Inf. test & Part-Whole	r= .26
22	Inf. test & Cancellation	r=—.17
22	Inf. test & Opposites	r=—.25
21	Math. & For. Lang.	r= .03
19	Math. & History	r= .90
22	Eng. & History	r= .81
25	Av. & Eng.	r= .96
25	Av. & For. Lang.	r= .96
21	Av. & Math.	r= .91
22	Av. & Hist.	r= .93
		Mean / Median
25	Eng.	82.1 / 82
25	For. Lang.	82.3 / 83
21	Math.	77.45 / 78
22	Hist.	79.06 / 80.5
25	Av.	83.6 / 85
25	Inf. test	41.48 / 39

SENIORS

No. of Students	Subjects & Tests Correlated	Correlation Coefficients
32	Information test & Av.	r= 0
30	Information test & Philos.	r= .36
18	Information test & For. Lang.	r=—.04
18	Information test & Eng.	r= .25
10	Information test & Hist.	r= .24
20	Information test & Educ.	r= .29
	Philos. & Hist.	r= .59
	Philos. & Eng.	r= .52
	Philos. & For. Lang.	r= .19
		Mean / Median
30	Philos.	85.7 / 85
18	For. Lang.	89 / 90
18	Eng.	86 / 87
10	Hist.	89 / 89
20	Educ.	87 / 88
32	Av.	88 / 88
32	Inf. Test	48.5 / 44.5

Whatever be the faults of such an information test, it certainly points out the lack of contact on the part of many college girls with the political and economic questions of today and gives an insight into the interests of the students which may not be disclosed in their work in required courses of study. In the case of the freshmen more than half of the correct answers pertained to the historical and literary questions that were based directly on the regular high school and college studies. The seniors, on the other hand, were more variable, being about evenly divided into those whose correct replies were based on knowledge retained from their school subjects, and those whose answers showed information gained through outside reading or intercourse. This difference may indicate a diversity in interests or it may be due to the fact that the more advanced college subjects require better information about current affairs, as courses in history and literature that concern present day life are so often placed among elective senior courses.

Besides this small group of freshmen who tried the information test, 99 were given a series of tests, mainly such as have already been standardized and seemed best adapted for group testing. In this way it might be possible to use the results for comparative purposes, though it was fully recognized that the difference in method between individual and group testing would affect the results. Still it was hoped that if the time limit could be standardized, more tests could be tried out and also be repeated several times on account of the saving in time by the group method.

1. *Color triangles.* This test was adapted from the one described by Bullough[1] and by Valentine[2] and the results were evaluated according to the aesthetic types suggested by these psychologists. Equilateral card-board triangles, 17.5 cm. on the side, were covered with colored papers so that the apex of the triangles (altitude 8.3 cm.) was of one color and the base of a different color, either darker or lighter. These triangles were arranged in ten pairs, each having the same color at the top in one triangle and at the bottom in the other. Thus if a light blue and a dark green were combined, the former would be at the apex in triangle A and at the base in triangle B of that pair. The color combina-

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[1] BULLOUGH, EDWARD. *The "Perceptive" Problem in the Aesthetic Appreciation of Simple Colour-Combinations.* Brit. Jour. Psychol. III, pp. 406–447.

[2] VALENTINE, C. W. *Experimental Psychology of Beauty.* Pp. 21, 27–30.

tions of the different pairs of triangles according to the Bradley colored paper scale were (I) orange shade 2 and orange-red shade 2; (II) blue shade 1 and yellow; (III) violet tint 2 and violet tint 1; (IV) yellow-green tint 2 and green tint 1; (V) yellow and yellow-orange; (VI) green blue tint 1 and green blue shade 2; (VII) orange-red and green shade 2; (VIII) green-yellow and green-yellow shade 2; (IX) yellow-orange tint 1 and yellow-green shade 1; (X) yellow shade 1 and green-blue shade 2.

After the test had been explained to them, the students were shown first triangle A of each pair and asked, "Do you like A better?" and then as triangle B was shown, "Or do you like B better? Write your choice, I like A, or I like B better." Both triangles were shown together for a minute so that a comparison could be made and triangle A was always held up on the right and B on the left. After the choice had been recorded by each one, they were asked to give the reasons for their preference.

2. *Substitution test.* Mrs. Woolley's substitution test was used and each student was given the four blanks and the key, face down. The group was given definite instructions by the investigator, who adapted those used by Mrs. Woolley. At a given signal all turned the papers, began the filling in, and at a second signal all stopped and turned the blank face down before the signal was given for the next. When the first three blanks had been filled the keys were collected, and the figures on the fourth blank were written from memory. The time given for each of the four blanks in order was 2 minutes, 90 seconds, 75 seconds and one minute. At the end of the test all of the blanks were collected.

3. *Cancellation test.* For this test blanks with the hundred letters (in capitals) of the H P L G test were used and 90 seconds allowed between the first and second signals, when the blanks were immediately taken up by assistants. The blanks were first shown to the students, the test explained and explicit instructions given, and then the blanks were distributed face down. At the given signal the blanks were turned and the marking was begun.

4. *Marble Statue.* Pyle's directions were used with the addition, "In reproducing the story, try to get not only the main facts but also the details." The story was read to the girls and they were given all the time needed for writing the reproduction.

5. *Genus-Species.* The Woodworth-Wells test was used. Pyle's instructions were followed and one minute allowed between signals.

6. *Part-Whole.* The Woodworth-Wells test was used according to Pyle's instructions. The time limit was one minute.

7. *Opposites.* Mrs. Woolley's list 8 of opposites was used and 90 seconds allowed.

8. Half of this group of freshmen tried the word-building test, and all the rest who could see the figures, the Ink Blot test. For the latter test the first ten ink blots were displayed by the investigator for 30 seconds each and the students told to write all that was suggested by each blot. The other division was also given 5 minutes to carry out the following directions given them on printed slips: "Using the letters E A I R L P, make as many words as possible. The words must be real English words, no word must contain a letter not in the list, and no word must contain one of these letters more than once."

Results

1. In the color triangle experiment only one student seemed to belong to the physiological type and one to the associative, 6 gave reasons partly objective and partly physiological, 3 combined objective, physiological and associative reasons, 9 objective-associative, and only one student, the same who obtained the highest scores both in class grades and tests, combined character judgments with objective estimates. The other 75% gave judgments that were apparently objective.

The red-green combination, triangle VII, proved a confusion triangle. Fifty-six students preferred red at the base, 51 of these otherwise choosing the A triangles in the majority of the cases, 40 preferred green at the base and 8 could make no choice between the triangles. It seemed that here on account of the doubt as to which hue was lighter or darker, the student would have to analyze her choice more carefully and that triangle VII might show a variance with the other judgments and perhaps a more analytical choice, especially in the case of the objective type. But the results did not verify this supposition. Those belonging to the objective class, whatever their choice, adhered to the same reasons as in the other judgments, and the more mixed types seemed not to make a special case of it.

Of the 99 students who gave their judgments on the color triangles, 10 preferred the darker color at the base, including VII A, 30 others made the same choice except in the case of the red-green combination, where they liked the red at the base better than at the top, and 3 chose the A triangles consistently except in one case, namely B in triangles I, II and VI respectively. Two students uniformly preferred the darker color at the top, because in that position it was more effective and attracted the attention first; and one girl made the same choice except in the case of the red-green (where she preferred A) on the ground of preference for the lighter color and liking the greater amount of it, which appeared when it was placed at the base. Four of the 10 preferring the darker color at the base did not give reasons of the objective type, but gave associations and pleasing or depressing effect of the arrangement as ground for their choice. Of the 33 in the second group, association predominates in 2 students, the physiological effect in one, and character judgments in a fourth. All the rest of these 55 girls gave judgments of the objective type, stressing balance, weight, amount, arrangement or contrast of color.

The rest of the 99 display such a miscellaneous choice that they seem impossible to classify, except that in the case of the red-green pair, they are about evenly divided in their preferences. This miscellaneous group contains 12 of the 20 whose preference was predominantly of the physiological, associative or character type. All the rest gave objective reasons for their choice. This classification of the objective type is unsatisfactory as in the final analysis the choice might come under one of the other types of judgment. But if the students are re-tested it may be possible to see what effect is produced by increasing maturity, college training and development of introspective ability. On account of the dubious interpretation of these results, it seemed futile to work out correlations of this test with the others. It may be of interest to note that of all the 99, six were evenly divided in their choice between the A and B triangles, and only 7 preferred the darker color at the apex in more than half the pairs, though, as has already been stated, over half of these students preferred this arrangement in one or more pairs.

In order to make comparisons with the class standings, all the results wherever possible were scored on the scale of 100. As each

substitution blank contained 50 figures, each figure filled correctly received a credit of 2. The first three sets of blanks were averaged and compared with the fourth. The correlation between the average of the first three blanks and the average of the fourth gives a coefficient .71 (P.E. .03). In substitution IV, though the average is only 35 (P.E. 8.36) and median 39, the mode is 50. The highest 25 percentile average 50, the lowest 18 and the middle 50 per cent. have an average of 38.

In the cancellation test also, every A crossed correctly counted 2. No letter except A was crossed out on any blank so no special calculation had to be made for errors.

In the Genus-Species and Part-Whole tests each correct answer scored 5.

In the Opposites test Mrs. Woolley's method of scoring was adopted, but it was found that additional words were given which were credited as follows:

Wise—ignorant (2), silly (2).
Busy—unoccupied (2), at leisure (2), inactive (2), resting (2).
Tender—harsh (2), cruel (2), callous (2), stern (2), unsympathetic (1).
Regular—uneven (2), absent (1), tardy (0).
Stale—new (2), good (1).
Heavy—slight (1).
Even—odd (2), irregular (2).
Certain—doubtful (2), doubt (1).
Silent—garrulous (2), talk (1).
Orderly—confused (2), careless (2), slovenly (2), sloppy (1), messy (1).

As the perfect score would be 40, every score was multiplied by 2.5.

In the "Marble statue" Pyle's norm of 67 ideas was taken as equivalent to 100, and the scores credited accordingly.

As it is possible to make 76 words in the Word-building test, this number was taken as 100 and credits assigned on the scale of 100. This method of scoring is probably unfair as at least 26 of the words given by Whipple[3] are very unusual, or are proper names. If these 26 words, ai, al, April, ar, Ariel, aril, ea, ela, Eli, epi, eria, Ira, Lear, pelra, lerp, pali, parel, pia, Ra, Rae, rale, Rea, rei, rep, rial, be omitted and the test scored on a basis

[3] WHIPPLE, G. M. *Manual of Mental and Physical Tests*, II, p. 642.

of 50 words, the calculation would be facilitated and grading might be fairer.

The highest score in the Ink Blot test was 23, so for convenience it was assumed that 25 would be the highest number and all the results were multiplied by 4. It had been planned to give some tests in puzzles and logical arguments, but the time did not permit these being tried. The averages on a scale of 100 for the different percentiles are given in Table III.

The average age of the freshman class was 18.19 years. Their average in the Marble Statue 36.2, as seen by Table III, is below Pyle's 18-year norm, 37.8, though their median and mode is 37. If arranged according to rank from highest to lowest as to general average and as to scores in the Marble Statue, the 17 who obtain the highest average get a lower rank in the reproduction of the story, and of the 30 whose class standing is highest, only one has a higher rank in the Marble Statue. On the other hand, of the lowest 30 in class rank 24 have a higher rank in the Marble Statue. Perhaps there is here an indication that the poorer students are more accustomed to verbatim repetition and therefore make better scores than do some better students who habitually try to get the gist in their own thought-terms. The fact that only two whose class rank places them in the highest quartile are among the lowest 25% in the Marble Statue and only 2 whose grades are among the lowest fourth are among the highest fourth in reproduction, shows that the accuracy and degree of retention must correspond somewhat closely to ability in college work, though, as was intimated above, other factors, especially capacity for verbatim repetition, make the results of the test variable.

The scores in the Part-Whole test as compared with Pyle's norms are a little lower, the mean being 19 as against 19.7, though the median for our freshmen is 20. Since the Woodworth-Wells series was used, the difference in the words may account somewhat for the slight difference in scores. That over 50% of the students make perfect scores, but that of these 52 not more than 8 are among the lowest fourth in class rank, indicates that there is a certain correspondence between speed and accuracy of association and class standing that may not be evident from the correlation coefficients.

The score for the Genus-Species test is exactly Pyle's male norm, and therefore lower than his female norm. Here again the difference in words must be taken into account, and also that the

median is 19. In this test 11 of the students in the lowest quartile as to grades are among those who make perfect scores, and also 7 of the highest quartile, a fact indicative of the variability which is illustrated by the varying correlation coefficients of this test with the freshman class grades. The average of these three tests, the Opposites, Part-Whole, Genus-Species, when correlated with the average of the class standings of the freshmen, gives a coefficient r = .03.

All the results of the substitution test (substitution IV) refer to blank IV of Mrs. Woolley's[4] substitution test. The percentile scores of our freshmen vary so widely from Mrs. Woolley's[5] accuracy scores that any definite comparison seems impossible. The percentile scores for 14-year-old working girls are 84.7, 95.9, 98.5 and for 15-year-old girls 89.1, 97.2, 98.8 as compared with 37.4, 64.4, 86.8 for our college freshmen. The difference must in part be due to the short time limit. It is a curious fact that 25% of these college freshmen get a score of 100% and still the 75 percentile score is barely above the 25 percentile score of Mrs. Woolley's 14-year-old working girls and below that of the 15-year-old girls. In contrast to the working children who in some cases "were more correct in the latter part of the page than in the beginning"[6] these college girls made the same mistakes throughout if some figure was incorrectly filled. Eight of the highest quartile in class grades, and 7 of the poorest also are among those who made perfect scores in Substitution IV, 7 of the poorest in the test are also lowest in college grades, 4 of the best students are among the lowest 25% in the test. Speed and accuracy in this form of learning evidently involve a number of factors, as is also evidenced by varying correlation coefficients in Table III.

Since in the cancellation test only A's were crossed out, the results given in Table III can be strictly compared only to Mrs. Woolley's[7] scores for fourteen-year-old girls. The divergence of the two sets of results is here even more marked than in the substitution test. Mrs. Woolley's percentile scores are 70.7, 81.6, 90.3 as compared with 39.2, 47.8, 55.6, the corresponding scores

[4] WOOLLEY, H. T., AND FISCHER, C. K. *Mental and Physical Measurements of Working Children.* Pp. 148–156.
[5] ibid. P. 152.
[6] ibid. P. 150.
[7] ibid. P. 110.

of the college girls. Not a single student made a perfect score and the lowest score for the college girls is 22 as compared with 30.8 for the working girls. So the time was evidently too short, and 2 minutes at least are needed for this test. The difference between the three percentiles is also greater for the fourteen-year-old working girls than in the case of the college girls.

In the opposites test the college girls are as decidedly superior to the working girls[8] as they are inferior in the two previous tests. The 75 percentile score of the 15-year-old working girls is just about equal to the 25 percentile score of the college girls, as can be seen from the freshmen scores 90, 97, 99.3 as compared with 71.2, 80, 88.9 for the working girls. About 42% of the freshmen make a perfect score in this test, 11 of these 42 being among the students in the highest quartile and 9 in the lowest quartile according to class standing. Of the lowest 25% in the test, only 3 are among the poorest quartile, but 5 are among the highest quartile according to grades. Such relation of good and poor students to this test is also shown by the low correlations with the college subjects, the highest coefficient being .22 with psychology, which includes only 30 students.

In the Word-Building test the college girls get a mean of 18 words as compared with Pyle's norm of 19.6 for 18-year-old girls, though the time limit was the same. If the Word-Building test is scored on the basis of 50 words as the 100% standard, the ascending percentile scores will be 19.6, 28, 30, 33.2, 35.5, 36, 38, 41.6 and 44.8 and the 25 percentile, 24.8, the 50 percentile 33, and the 75 percentile 37.6. The lowest score is 6 and the highest 66. The distribution on both sides of the median is very regular. If the test were scored on the basis of 50 words and the time limit increased to 7 minutes, it might prove to be a better test for quickness of association as well as of ingenuity than some of the association tests which prove too easy for 70% of the students when given as group tests.

The Ink Blot test seems least suited of all these tests for group work, as it is difficult to see them even at a short distance. Pyles' norms are not given for girls beyond 13 years. At this age his norm is 10.3. For these 23 college girls who were able to see the blots, the mean is 14, and the median 12 blots; the lowest score is 10 and the highest 23.

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[8] ibid. P. 221.

TABLE III.

Grades, Tests and Correlations

	Average	English	For. Languages	Mathematics	History	Psychology	Substitution IV.	Genus Species	Marble Statue	Part-Whole	Cancellation	Opposites	Word Building	Ink Blots
No.....	99	94	54	46	42	30	99	99	97	97	99	99	48	23
Worst....	58	53	53	52	65	55	18	50	20	45	22	77.5	3.9	40
10%.....	71.6	65	67.8	60	69.5	60	27.6	58	34	70.5	36	85.7	12.9	40
20%.....	76.8	72.7	74.8	67.2	72.7	69	41.4	74	43.8	89.5	40.6	92	18.4	40
30%.....	78.5	74.4	77.8	70.8	74	72	51	81	47.9	95	43.8	95.5	19.7	40
40%.....	79.9	76.3	80	72	75.2	73.6	61.6	85	51.9	95	47.2	97.5	21.8	40
50%.....	81.2	78.8	82	74.8	76.5	78.6	73.4	90	54.9	97.5	50.2	97.5	23.2	48
60%.....	83.2	80.6	82.8	77.8	78	80.3	79	95	57.3	100	52.6	98.25	23.6	56
70%.....	84.8	82.5	85.1	82.8	80.5	83.6	90	99.5	59.5	100	56.8	100	25	68
80%.....	85.9	85.2	87.5	88.4	83	86.6	98.4	100	62.2	100	62.2	100	27.3	72
90%.....	88	87.2	89.1	92.8	86	88.3	100	100	65.8	100	69.4	100	29.4	76
Best.....	94	92	95	95	90	95	100	100	76	100	92	100	43.3	81.2
25%.....	74.4	69.7	71.1	64.1	70.7	65.4	37.4	68.8	40.5	83	39.2	90	16.3	40
50%.....	80.1	76.3	80	72.3	75.8	75.7	64.4	86.4	52.3	96	47.8	97	21.5	44.8
75%.....	84.1	81.1	84.2	78.9	80.5	82.4	86.6	97.8	58.9	100	55.6	99.3	24.7	62.4

	Substitution I, II, III.	Substitution IV.	Genus Species	Marble Statue	Part-Whole	Cancellation	Opposites	Word Building	Ink Blots	Information (Senior)	Information (Freshman)
No. of Students.....	99	99	99	97	97	99	99	48	23		
Highest score.....	100	100	100	76	100	92	100	43.4	81.2		
Lowest score.....	18.6	18	50	20	45	22	77.5	3.9	40		
Mean.....	86.8	72	86.5	54	95	54	96.5	23.6	56	41.8	39
Median.....	94.6	78	90	55	100	52	97.5	23.6	48	48.56	44.5
Mode.....	100	100	100	55	100	40.52	100	23.6	40		

Subjects	No.	Mean	Median	Mode	Substitution IV.	Genus Species	Marble Statue	Part-Whole	Cancellation	Opposites	Word Building	Ink Blots	Opposites, Part-Whole & Genus Species
For. Lang.....	54	83	82	88.81	—.03	.03	—.14	.31	.20	.01			
Math.....	46	74	75	71	0	.19	.16	.32	.19	.05			
Hist.....	42	80	77	74	.13	0	0	0	.06	.01			
English.....	94	79	79	86.74	.23	.06	.38	.29	.57	.14			
Psychol.....	30	78	80	80	.48	.26	.43	.32	.05	.22			
Class Av.....	99	81	82	85.80	.16	0	.20	.25	.11	.08	.23	.23	.03

	For. Lang.	Math.	Hist.	English	Psychol.
For. Lang.		.48	—.99	0	
Math.	.48		.56	.38	
Hist.	—.99	.56		.29	
English	0	.38	.29		.75
Psychol.				.75	
Class Av.					

The percentile table shows the striking differences between the class standings and test scores. In none of their class averages do these students get as low nor as high marks as in the tests. As a matter of fact, a few of these freshmen failed utterly in some of their college subjects, but as they did not take a final examination their grades were not given on the college register and could, therefore, not be used. If these had been put down, the lowest scores would probably have been very similar. The percentile averages in foreign languages agree best with the general averages. English, mathematics and psychology give very similar distributions of the percentile averages, while the standings in history are higher at the lower and lower at the higher end than the grades in other subjects.

The substitution test is the only one that is somewhat comparable with the class standings, especially in history, mathematics, English and psychology, but only in the percentiles just above and below the median. If the actual scores are disregarded the distribution of percentile averages is somewhat similar in mathematics and cancellation, in psychology and Marble Statue.

The correlations of these tests with the general class averages range from 0 to .25, being in ascending order, Genus-Species 0, Opposites .08, Cancellation .11, Substitution .16, Marble Statue .20, Word-building and Ink Blots .23, and Part-Whole .25. The only negative correlations are found between foreign languages and Marble Statue (—.14). History shows very slight positive correlation with any of the tests, the coefficients being 0 in Genus-Species, Part-Whole and Marble Statue and the highest .13 with the Substitution test. In ascending order of positive correlation with the six tests, the college subjects range as follows: History, foreign languages, mathematics, English and psychology.

In comparison with Waugh's[9] coefficients of correlation, these college girls give much lower coefficients than the Beloit students,

[9] BELL, J. CARLETON. *Mental Tests and College Freshmen.* Jour. Educ. Psychol. VII, 7, p. 382.

.08 as compared with .54 for Opposites, .16 as against .24 in the Substitution test, and .20 as compared with .40 for Retention of Ideas (Marble Statue). Of the tests used by Bell[10] for the Texas University freshmen, the only one at all comparable with the Newcomb College tests is the Triangles, which is a cancellation test. Except at the lowest end the percentile scores of the Texas freshmen in the Triangles test are higher than those of the Newcomb freshmen in their cancellation test. The Texas students, however, show much lower correlation coefficients for this test with their college subjects, the difference being especially noticeable in English, where the coefficient of the Texas freshmen is .01 and of the Newcomb girls .57.

These 99 freshmen may also be classified according to courses, into 47 B.A. students, 34 Education and 18 Art and Music students. In the color triangle test 90% of the B.A. group, 70% of the Education group and 72% of the Art and Music group give objective judgments. On the other hand, 11% of the Education students, 11% of the Art and Music students and only 6% of the B.A. students give associative judgments, while 2% of the B.A. students, 9% of the Education and 5% of the Art and Music girls belong among the objective-physiological type. Though the number of the students giving judgments of the two latter types are few, it is significant that students in Education and in Art and Music should agree better with each other in their aesthetic judgments than either of them with the B.A. group.

In contrast to this grouping, Table IV shows very different interrelations between the three groups in respect to the means and medians of the other tests and the correlation of these tests with the general class average.

In five tests the Art and Music students have a higher mean than the other two groups. The one exception is the Marble Statue in which the Education division make a better average, though their class average is below that of the B.A. and the Art and Music students. The Education students alone get uniform positive correlations between the tests and their class average, and the Art and Music group get negative correlations with the exception of the Genus-Species test where the coefficient is

[10] ibid. Pp. 381–399.

TABLE IV

Scores of Student Groups

	Subst.		Genus-Sp.		M. Stat.		Wh.-Part		Cancell.		Opposites		Average	
	Mean	A. D.	Mean	A. D.	Mean	A. D.	Mean	A. D.	Mean	A. D.	Mean	A. D.	Mean	A. D.
B. A.....	70.0	9.8	89.0	2.02	53.7	5.7	95.2	1.0	55.4	5.5	95.75	1.6	82.1	4.6
Educ.....	72.2	12.3	84.5	2.3	56.3	4.8	93.5	1.5	51.4	4.8	95.25	1.5	79.8	5.0
Art and Music...	76.0	8.5	91.5	1.1	54.4	5.5	95.25	.94	59.0	5.3	98.25	.88	81.5	3.55
	Median		Median		Median		Median		Median		Median		Median	
B. A.....	76		95		55.2		95		52		97.5		82	
Educ.....	78		85		55.2		100		50		97.5		83	
Art and Music..	80		100		58.2		100		48		100		81	

Corr. with Class Av.	Subst.	Genus-Sp.	M. Stat.	Wh.–Part	Cancell.	Opposites	Eng.
B. A.....	—.05	—.08	.08	.37	.20	.11	.71
Educ.....	.48	.06	.40	.35	.05	.34	.73
Art and Music...	—.16	.19	—.64	—.22	—.03	—.19	.80

positive. The B.A. students are the most variable in regard to these correlations. The higher and closer correlation coefficients of the average with English are in conspicuous contrast to the other coefficients.

If compared with the mean of the whole freshman group, the B.A. students have a mean in the Opposites and Substitution tests below the general mean, and the Education students are below the freshman mean in the Genus-Species, Part-Whole, Cancellation and slightly in the Opposites tests. Their grade average is also lower than the class average. The Art and Music students are above the freshman mean both in the tests and class grades. As measured by the freshman medians the B.A. students have lower medians in the Substitution and Part-Whole tests and the medians coincide in Cancellation, Opposites and grade average. The Education students score lower in the Genus-Species and Cancellation and coincide with the general median in Opposites. The Art and Music students fall below in Cancellation and Average. It seems to follow from these facts that the B.A. students are inferior in the Substitution test, Education students in Genus-Species and Cancellation, and that the Art and Music group get fewer low scores than either of the other two groups whether reckoned according to the mean or the median.

There were eight freshmen who obtained an average of 90 or above in class standing and there were also eight who were below 75. Table V shows the scores of these sixteen students:

TABLE V.

Class Standing of Poorest and Best Students

POOREST STUDENTS

Student	Average	English	Foreign Lang.	Math.	Hist.	Psychology	Information	Opposites	Cancellation	Genus Species	Part Whole	Building Word	Marble Statue	Ink Blots	Subst. IV
75....	58	72			73			97.5	85	100	95	18	65		50
67....	67	71						100	61	60	100		38		34
5.....	69	71	53	60	74			97.5	68	100	100		60	52	100
1.....	70	64				55		90.5	58	100	95	22	37		100
20....	72	74	71	52	65		52	100	70	70	80		20		76
58....	73	65				67		97.5	44	95	95		55		96
44....	73	53			76			80	50	55	75	26	53		32
79....	74	66	84	77	80			100	42	100	95	22	60		98
	69.5	67	69.3	63	73.6	61		95.3	59.7	85	91.8	22	48.5		73.2

BEST STUDENTS

39....	94	90				95		100	70	100	100	25	73		100
54....	93	92	90	94				97.5	68	100	100		64		80
30....	91	90	89	88			74	97.5	58	80	100		49		80
99....	91	87			78		33	100	42	100	100		59		24
16....	90	83	90	95	90			97.5	52	100	95	23	61		100
19....	90	82						100	50	75	75		55		68
21....	90	86	94	93	90		58	100	48	80	100		53		80
26....	90	86	89	95	90			100	50	95	100	19	47		44
	91.1	87	90.4	93	87		55	99.06	54.7	91.2	96.2	22.3	50.1		72

It is evident that the poorer students have a lower average in Opposites, Part-Whole and Genus-Species, most decidedly in the latter; that they differ very little from the better students in the Marble Statue and Substitution tests, and that the scores and the average in the Cancellation test are in their favor. Those who obtain the highest class standings are apparently superior in speed and accuracy of association, but in work which tests accuracy and speed of discrimination and of learning, there is besides the variability due to the complexity of the processes, probably also a conflict between quickness and accuracy. In the Marble Statue we find that scoring on the basis of the number of ideas as given by Pyle gives the better grade students somewhat higher standings. If the reproductions are marked more on a qualitative basis, that is, on ability to grasp main points

and to organize details accurately and logically, the best students seem more decidedly superior in this test.

Conclusions

1. Group testing of college students is feasible and an economy of time especially in measuring speed and accuracy of association and memory and in certain types of learning and reasoning. Measurement of motor ability can then be made individually in a brief time.

2. Of the standard tests outlined above the Cancellation, Substitution, Marble Statue and Word-Building seem most suitable and valuable for group testing. The three tests in speed of association, the Genus-Species, Part-Whole and Opposites seemed too easy for the great majority of the students and may become mainly tests in speed of writing if the time limit is shortened. Of the latter three the Opposites seems of most worth, as it may be made a measure of accuracy as well as speed of association and may be an index to a certain type of mental maturity, if the results are compared with the scores of immature children and those whose school career is limited, as Mrs. Woolley's working girls.

3. At least two trials of association and memory tests are needed to avoid results that in the one case are affected by some momentary inability to get the right word, and in the other, may be a measure of immediate repetition rather than of organized retention. In memory tests both a quantitative and qualitative basis of calculating results seems advisable.

4. Although many factors render the Information test inaccurate, still its value in giving sidelights on a student's interests and his understanding of terms, in common use but vaguely defined, seems great. It also stimulates inquiry and a search for more definite knowledge on the part of the students. If the questions could be frequently changed or half of them replaced by terms relating to the current events of each year, it might serve several useful purposes. The higher correlations of this test with the Senior subjects than with the Freshman may be due in part to the practice of giving courses relating to present-day life as Junior and Senior electives.

5. Aesthetic tests ought to be used in addition to those commonly used to reveal both the different types of aesthetic judg-

ment and the student's tastes. Such a test as the color triangles serve the purpose as an introductory test in aesthetic analysis. The classification into the four types used by Bullough and Valentine is not satisfactory, and therefore there is still more need of wider use of such tests. In the experiments of Bullough and Valentine the women tested gave a preponderance of the associative judgments. Among the freshmen tested only 12% gave associations as basis for some of their estimates, and in only one case did the associative judgments preponderate over the other types. Our results show a very great preponderance of objective judgments, though as has already been stated, these might be resolved into different types of judgments after more careful analysis on the part of the students.

6. The correlation coefficients are more variable for the college subjects correlated with each other than with the tests. The coefficients in the former case vary from —.99 between history and foreign languages to .75 between English and psychology, and in the latter from —.14 between foreign language and the Marble Statue to .57 between English and Cancellation. (Table III.) It may be worth while to remark incidentally that the correlations of subjects with each other might well be considered in grouping together major and minor courses.

7. Tests such as those tried in this experiment may be a valuable aid in vocational guidance. The very fact that the scores of the students in these tests vary so widely from their class standings gives the examiner a better insight into their capacities. If the scores of college students (1) in physical examination, (2) in college subjects and college activities, (3) in tests of their ability in reasoning, association, memory, speed and accuracy of learning, and of their interests and tastes be all combined, the resultant ought to be a fair index of their vocational capacities.

ECHOLALIA IN IDIOTS: ITS MEANING FOR MODERN THEORIES OF IMITATION

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In recent years much light has been cast upon normal psychology through the interest bestowed upon abnormal minds. The insane and neurotic have been studied from the standpoint of instinct and volition by Janet, by the Freudians, and by Adler and his disciples, but in the case of aments (mental defectives) the new knowledge gleaned has related largely to the cognitive processes. The affective and volitional life of aments has not been systematically observed and described. I wish to present in this paper three cases of echolalia occurring in idiots, with a view to ascertaining, if may be, what, if any, light this phenomenon may cast upon modern controversies about the nature of imitation in man.

For the benefit of those who have made no special study of pathological psychology, and who are therefore not completely oriented in this special field, it may be stated that echolalia is an interesting tendency found in aments and in certain insane patients, to *repeat* or *echo* automatically whatever is said to them or in their hearing. Barr[1] defines echolalia as follows: "We find echolalia a rare form of aphasia, betokening always a marked mental impairment, and therefore most naturally associated with other forms of degeneration. There being no record of the autopsy of such a case, the precise lesion, if there is one, remains yet to be demonstrated.

"In the act and in the echo he (the patient) is simply a creature of suggestion. His capacity for receiving such suggestions so rapidly as to echo these instantaneously, without thought, would tend to show less impairment of the sensory than of the motor centers, and therefore confirms my impression that the defect, not so much sensory as motor, is to be defined as transcortical aphasia."

Pick[2] has called attention to the occurrence of echolalia in aphasia patients, and regards the manifestation in these cases

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[1] Barr, M. W. *Mental Defectives.* P. Blakiston's Son & Co., Phila., 1913 ed.

[2] Pick, A. *Zur Frage nach der Natur der Echolalie.* Fortschritte der Psychologie. Jan. 4, 1916, Heft I, Bd. IV.

as dependent on a conditioned reflex. "Für niemanden, der auch nur einmal an einem Aphasischen jene Form der Echolalie beobachten konnte, die Wir ihres Tempos wegen als die 'auf Anhieb' bezeichnen, kann es zweifelhaft sein, dass es sich dabei um die Auslösung enies Vorganges handelt, der sich als einem Reflexe gleich darstellt.—Dementsprechend bin ich seit langem dafür eingetreten, dass es sich bei der Echolalie auf Anhieb um das Funktionieren eines in der Norm gehemmten, in der Krankheit von den Hemmungen befreiten, Mechanismus handle." In at least one of the cases cited by Pick the mental condition of the patient, an old man, eventually cleared, whereupon the echolalia ceased along with the other symptoms.

Barr,[3] Lichtheim,[4] and Bastian[5] have attempted to explain the probable neurological basis of echolalia and of the similar condition, echopraxia (which is the tendency to repeat movements made by others), but the neurological aspects of the matter do not chiefly concern us here. In describing the phenomenon Bastian says: "It sometimes happens that the speech of patients is entirely limited to a mere imitative repetition of words spoken in their hearing, while they are without the power of volunteering any statement; that is, their auditory word centers respond only to direct incitations, and not at all to those of an associated or volitional order. In these cases (usually included under the term echolalia) a marked general impairment almost invariably co-exists."

Echolalia has been confused in the minds of some authors with other conditions which only remotely resemble it, such as coprolalia (the tendency to repeat spontaneously certain obscene or profane words or phrases). Thus Mills[6] confuses echolalia with morbid impulses in general. The term echolalia should properly be confined, for the sake of clearness, to that condition in which the patient repeats or *echoes* what he has just heard, with relatively little power of originating or of spontaneously uttering remarks of his own.

That echolalia has not been discussed more fully in the literature of pathological psychology is doubtless due to the infre-

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[3] Barr, M. W. *Op. cit.*
[4] Lichtheim. Brain. Vol. VII. (Cited by Barr.)
[5] Bastian, H. C. *Aphasia and Other Speech Defects.* D. Appleton and Co., New York, 1898.
[6] Mills. Am. Text Book of Diseases of Children. P. 663. (Cited by Barr.)

quency of its occurrence. The term echolalia was first used by Romberg, and the condition was for some time described only in connection with coprolalia or with palmus (tic). Noir[7] in 1893 asserted that he had found echolalia occurring without any tendency either to coprolalia or palmus. Since that time Langdon Gray,[7] Barr[7] and others have described cases of pure echolalia occurring in aments. As to the frequency of its occurrence, Beach[7] and Shuttleworth[7] report that there are only a few cases to be found in their large institutions. R. L. Down[7] reports it in about 4% of the aments under his care. Barr[7] in a personal examination of 2500 mentally defective children is able to report two cases of what might be called true echolalia. In the personal examination of about 5000 cases of amentia, I have seen three clear cases of echolalia, one occurring singly; one occurring in connection with echopraxia; and one occurring in connection with a motor automatism. These cases[8] were as follows:

CASE No. I. E..... D..... Female. Aged 5 years. American born of Jewish parents. Brought for mental examination because she did not behave as other children behave, and was stupid. The patient did not walk till she was three years old, and did not talk till she was a little older. When finally she began to speak, she *echoed* what she heard, not volunteering or originating any remarks of her own. When questioned, she merely repeated the question, apparently without any idea that a response was expected from her. The mother, having no insight into the true condition, had been accustomed to punish the child severely, on the supposition that she was "just fresh," and that the echoing of the words of her elders resulted from an incorrigible impudence. Such discipline was attempted by the mother in the clinic, during the course of the examination.

When tested by means of the Binet and other mental tests, no *response* whatever was elicited from the child. She echoed automatically and immediately all the questions put to her, but showed no understanding of the question-response situation. Her pronunciation of the words echoed was quite distinct. Her attitude was docile and friendly throughout. She simply sat on the chair, and echoed whatever was said to her. For example, the conversation ran somewhat as follows:

Q. "Are you a little girl or a little boy?"
A. "Are you a little girl of a little boy?"
Q. "What is this?"
A. "What is this?"
Q. "No, no, baby! You *answer* what I say."
A. "No, no, baby. You answer what I say."

None of the mental tests was successfully passed, except such as involve the repetition of words or numbers.

No tics or spasmodic movements accompanied the echolalia. The questions were simply *repeated* instead of being *answered*. The mother stated that this had been the case from the time the child first began to utter words. There was no response at all to copying tests or construction tests. She was unclean in her habits, and showed no power of responding to tests of intelligence. Her case was rated as one of idiocy, bordering on low grade imbecility.

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[7] See BARR, M. W. *Op. cit.*

[8] These cases were observed by the writer while engaged as Clinical Psychologist in the Department of Public Charities of New York City, and at Bellevue Hospital.

CASE NO. II. M..... M..... Female. Aged 11 years. Born in America of Irish parents. Brought for mental examination by the ....., a society for the care and protection of children. Both her father and mother were said to be under treatment in the alcoholic wards at Bellevue. This patient echoed both words and movements. She imitated exactly even the tones and inflections of the examiner's voice. The echo was automatic and inevitable. She echoed not only words addressed to her, but also what was said by others in the room. No *response* whatever could be elicited from her, other than a reproduction of what was said or done by the person attracting her attention. In this way she performed copying tests, and tests involving the repetition of sounds. Her ability to reproduce words and tones was astonishingly good, but her reproduction of movements was not precise. She was afflicted with chorea, and though she would take the pen or pencil and try to copy a square or diamond, just as she had seen the examiner do, the result was not identical with that achieved by the examiner. She was entirely lacking in ability to adapt herself independently to even the simplest situations, and her actual intelligence was not above the grade of idiocy.

No developmental history could be obtained in the absence of both of the parents.

CASE NO. III. Unknown man. Aged about 30 years. Brought in from the streets. He was found by the police, wandering about, and when questioned gave no answers, but instead repeated what was said to him. Accordingly he was sent to the hospital for examination. This patient, when questioned, merely echoed, as best he could, the words said to him. His response was mechanical, and was accompanied by a peculiar automatism. As he began to articulate, his right hand would fly up to his left shoulder and execute two sharp, successive slaps; then fall back to its normal position again.

The patient could obey simple commands, such as "sit down," "stand up, now," etc., but he showed no power of adapting himself to situations and commands beyond this. The neurological and psychiatric examination failed to establish a psychosis, and a diagnosis of idiocy was made. No history of any kind could be elicited.

Recently Prof. Thorndike[9] has called into question the use of the word "imitation," and has clarified thought by raising to the consciousness of his readers the lack of precision with which the word has hitherto been used. Prof. Thorndike states his position thus:

"It is better—instead of asking vaguely whether imitation of other men is an original tendency in man, to put separately the following questions:

"A1—Do the sense presentations (chiefly through sight) of all movements as made by another, produce in man, apart from all training, *identical* movements?

"A2—*Similar* movements?

"A3—*Tendencies to make similar* movements?

"A4—If some, but not all, movements have this power, which are they?

"B1—Do the sense-presentations of all positions of the body taken by another, all sounds made, all facial expressions

[9] THORNDIKE, E. L. *The Original Nature of Man.* Teachers College, Columbia University, 1913.

assumed, and other results of movement upon the mover's body, produce in man, apart from all training, movements resulting in *identical* positions, sounds and looks?

"B2—*Similar* ones?

"B3—*Tendencies to make movements,* resulting in similar or identical ones?

"B4—If some, but not all, positions, sounds, looks and the like have this power, which are they?"

Prof. Thorndike's contention is that "The direct potency of behavior in creating something like it in another human being's behavior is not discoverable in any series of experiments in which the effects of the laws of exercise and effect are precluded or allowed for"; also that "the same absence of evidence of any general original production of similar behavior by behavior witnessed, holds good for sounds as well..... No one can believe that *all* of a child's speech is acquired by direct imitation. On many occasions the process is undoubtedly one of the production of many sounds, irrespective of the model given, and the selection of the best one by parental reward."

Prof. Thorndike judges, therefore, that "the original attentiveness of man to the acts, movements, positions, sounds and facial expressions of other men, and the original satisfyingness of the approval so often got by doing what other men do,—are really the tendencies or predispositions or potentialities that do the work in question."

After critical discussion of the use of "imitation" by such social psychologists as Tarde and McDougal, Prof. Thorndike concludes: "On the whole, the imitative tendencies, which pervade human life, and which are among the most powerful forces with which and against which education and social reform work, are, for the most part, not original tendencies to respond to behavior seen by duplicating it in the same mechanical way that one responds to light by contracting the pupil, but must be explained as the results of the arousal, by the behavior of other men, of either special instinctive responses or ideas and impulses, which have formed in the course of experience, connections with that sort of behavior. Man has a few specialized original tendencies, whose responses are for him to do whatever the man forming the situation does. His other tendencies are habits learned nowise differently from other habits."

The few specialized original tendencies to respond by doing what the man forming the situation does are, "smiling when smiled at, laughing when others laugh, yelling when others yell, looking at what others observe, listening when others listen, running with or after people who are running in the same direction, running from the focus whence others scatter, jabbering when others jabber and becoming silent when they become silent, crouching when others crouch, chasing, attacking and rending what others hunt, and seizing whatever object another seizes."

To Prof. Thorndike's discussion and final conclusion Prof. Montague[10] has made persuasive objection, on the ground that the former has drawn a false analogy between sympathetic magic and the theory that given behavior tends to produce similar behavior in witnessing human beings. Prof. Montague declares that Prof. Thorndike overlooks the presence of a sensitive medium of communication, which exists in the case of ideo-motor activity, *i. e.*, the nervous system; whereas in the case of sympathetic magic no medium of communication or transmission exists. Herein, according to Prof. Montague, lies the failure of the analogy. It is pointed out that such an imitative tendency as yawning when others yawn can scarcely be said to have survival value from either the biological or social standpoint; that, moreover, though response to *elements* in imitated situations may have been either inherited or learned by trial and error, so that habit would account for the imitation, nevertheless it is the *tout ensemble* of the situation, not the separate elements, which is important, and this is often absolutely novel.

The nature of imitation, and the propriety of its inclusion among the instinctive tendencies of man, is thus a controverted question. Does the behavior of our idiots furnish any new light to the controversy? We appear to have in Case No. II an instance in which "sense-presentations of all movements as made by another, produced in an individual, apart from all training, tendencies to make similar movements," and also in which "all sounds made produced in the individual attending, similar sounds." This child was an idiot, without the power of originating spontaneous remarks. She had not the intelligence to learn to perform even the simplest acts independently. It would

[10] MONTAGUE, W. P. *Prof. Thorndike's Attack on the Ideo-Motor Theory.* Journ. of Phil., Psych. and Sci. Meth., 1914.

seem that in such a case we do have an original tendency to respond to behavior perceived, "by duplicating it in the same mechanical way that one responds to light by contracting the pupils."

In Case No. I we have the reproduction of sounds, made apparently quite automatically, "in response to sense-presentations, apart from all training." This child also was an idiot, bordering on low grade imbecility. She had not even sufficient intelligence to respond independently to the simplest situations, such as replacing the blocks in the Vineland Form Board. Surely it could not be argued that her reproduction of questions put and of statements uttered had been learned because of the satisfyingness of parental approval, for she had been severely punished for the "echoing," and yet was unable to learn by pain to inhibit it. She got nothing but social disapproval for her reaction, yet she made the same reaction mechanically and inevitably.

In Case No. III we have an adult who persisted with mechanical certainty in performing an act of imitation which was socially the least useful act conceivable. Here also sense-presentations produced in a human being tendencies to make similar sense-presentations, apart from all training. In the case of Barr's imbecile it was found by experiment that he could reproduce with facility words uttered in his hearing in nine different languages, with which he was totally unfamiliar.

The echoing of Pick's aphasia patients also presents problems of interest for the student of imitation. These questions naturally arise: Does the echoing of such patients result from an organic lesion? Or is it functional in character? Is it *related* psychologically to the echoing of idiots? Is it, perhaps, *identical* in its nature with the phenomenon observed in idiots? The aphasia patients had formerly acquired, at a time when they were of normal intellectual status, the knowledge of the use and meaning of words. Hence their echoing of words may not be said to have taken place "apart from all training." Furthermore, these patients may "clear up," and return to normal again, then ceasing to echo. The idiots, on the other hand, never have been and never will be "teachable."

It is unfortunate that so very little is known about the three cases here presented. It would be scientifically desirable to have known each one from birth, and to have observed the very begin-

nings of this phenomenon. It would also be desirable to observe them over long periods, and to try various pedagogical devices on them, to determine, if possible, the modifiability of the tendency to echo. Since it occurs so rarely, it is probable that a long time will elapse before any detailed and careful study of echolalia in idiots can be made from the psychological point of view. In the meantime it is difficult to see how the reaction of these extreme cases is to be explained except on the ground of an original tendency to ideo-motor activity. And if we so explain it, are these persons to be regarded as suffering from some lesion which sets them apart as an absolutely separate species? Or do they merely show, in an extreme form, an instinct that exists as an element in the original nature of man, and is distributed according to the curve of probability?

THE MENTALITY OF THE DEPENDENT CHILD, TOGETHER WITH A PLAN FOR A MENTAL SURVEY OF AN INSTITUTION

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The mentality of the delinquent child has received a considerable amount of attention and we have at the present time a great number of books and articles dealing entirely or in part with this problem. Relatively little, however, has been written about the mentality of the dependent child. The reason for this is obvious, because the delinquent child challenges the attention of the social worker and his delinquency demands an explanation. The delinquent is in one sense a more serious problem than the dependent. Nevertheless, the dependent child, while not occupying so dramatic a position as the delinquent, presents a very difficult problem to society, and one of the factors that will help us solve the problem of the dependent is a little better knowledge of the mental make-up of this class of children. An examination of the mentality of this class becomes more urgent from the practical sociological point of view, the more we insist upon the best methods of dealing with these children. The right of the child to a home and to all that goes with a home, which an institution cannot give, may be called a modern conception of our duty to the dependent child. This has given rise to the placing of children in homes either for temporary care or for permanent adoption. "Child-placing," as a means of caring for dependent children, is practised on a much larger scale today than it ever has been. To carry out such a scheme satisfactorily, we must know a great many things about the home in which the child is to be placed and we ought also to know as much about the child as possible to make sure he will fit into his new environment.

It is not our purpose to deal with all the factors that should determine the right home for the right child. We shall only deal with one factor, the mentality of the child. No subnormal child should be placed in a complex environment and be expected to succeed; no feeble-minded child should be given to unsuspecting parents for adoption. It will be readily seen that child-placing agencies assume a great responsibility in the placing

out of children, and this responsibility is recognized by the best of such agencies in their insistence upon a thorough mental examination of each of their wards before they are placed out in homes.

The literature dealing with the mentality of the dependent child, as far as the writer can discover, is very scanty. A recent work of Stenquist, Thorndike and Trabue[1] showed the results of tests of dependent children as compared with public school children, and in general the dependents fell below the other children in mentality. Hall[2] reported tests in the orphan asylums of New York State and found on the whole that this class of children was somewhat inferior to the public school children that were tested with the same tests for comparative purposes. Streeter[3] gives a summary of the children tested in the orphanages in New Hampshire. The Binet Scale was used. The distribution of 1248 children shows 49 per cent. normal, 30 per cent. backward, and 21 per cent. feebleminded. This seems an abnormally high percentage of feeble-minded, and approaches the customary percentages of feeble-minded among delinquents. Pintner[4] in comparing delinquents and dependents at the juvenile court found a much larger percentage of feeble-minded among the delinquents than among the dependents. He says, "The chief characteristic of this group of dependent children is their backwardness."

The present investigation deals with two groups of dependent children: (1) Eighty-two children tested by the writer for the Ohio State Board of Charities; these were cases which for various reasons had come under the immediate care of the Board; (2) 106 children forming the total population of a county children's home, with the exception of children below age six. We shall first give a brief discussion of the results of the tests of these two groups from the point of view of the percentage of feeble-minded among dependents, and then a more detailed discussion

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[1] STENQUIST, J. L., THORNDIKE, E. L., and TRABUE, M. R. *The Intellectual Status of Children Who Are Public Charges.* Archives of Psychology, No. 33, September, 1915.

[2] New York State Board of Charities. *Eleven Mental Tests Standardized.* Eugenics and Social Welfare Bulletin, No. V.

[3] STREETER, L. C. *Existing Conditions Relating to Defectives and Feeble-mindedness in New Hampshire.* Report of New Hampshire Childrens' Commission, 1916.

[4] PINTNER, R. *One Hundred Juvenile Delinquents Tested by the Binet Scale.* Pedagogical Seminary, Vol. XXI, No. 4, December, 1914, pp. 523–531.

of the tests conducted at the children's home from the point of view of the best method of making a mental survey of an institution.

Feeble-Mindedness Among Dependents

(1) *State Charity Cases.* The eighty-two state charity cases were sent to the writer for mental examination from time to time during the past three years. The first 56 cases were tested by the Binet Scale, and the last 26 by the Yerkes-Bridges Point Scale. The diagnosis of the first 56 on the Binet Scale is as follows:

	No.	%
Normal	21	37.5
Backward	19	34.0
Feeble-minded	12	21.4
Doubtful	4	7.1
Total	56	100.0

The percentage of feeble-minded here is high and this, we believe, is owing to the rather select group of cases with which the State Board has to deal. There seems to be a tendency to refer particularly difficult cases to the Board. Furthermore, we feel that the tendency of the Binet Scale, following the usual method of diagnosis, is too severe and results in too high a percentage of feeble-mindedness.

The twenty-six cases tested by the Yerkes-Bridges Scale have been diagnosed by two methods: (1) the C. M. A. (Coefficient of Mental Ability) method, taking .75 as the dividing line between feeble-mindedness and backwardness, and .90 the line between backwardness and normality. This gives us the following distribution:

Normal	8	30.5
Backward	7	26.8
Feeble-minded	11	42.4
Total	26	99.7

This group shows a much higher percentage of feeble-minded than the group tested by the Binet. The percentage seems to us unreasonably high. (2) The Three Per Cent. Hypothesis suggested by Pintner and Paterson[5] using the dividing lines for the groups as computed by them. This gives us the following distribution:

[5] Pintner, R., and Paterson, D. G. *A Psychological Basis for the Diagnosis of Feeble-mindedness.* Journal of Criminal Law and Criminology, Vol. VII, No. 1, May, 1916, pp. 32–55.

Normal	9	34.4
Backward	13	49.8
Feeble-minded	4	15.4
Total	26	99.6

Here the percentage of feeble-minded is considerably diminished and the number of backward cases increased. I cannot help feeling that this is a truer statement of the actual mental condition of the cases than that arrived at by the C. M. A. method.

Combining all the 82 cases we arrive at the following distribution:

	Binet and Yerkes (C. M. A.)		Binet and Yerkes (3% Hypothesis)	
	No.	%	No.	%
Normal	29	35.4	30	36.6
Backward	26	31.7	32	39.0
Feeble-minded	23	28.0	16	19.5
Doubtful	4	4.9	4	4.9
Total	82	100.0	82	100.0

Even the more conservative estimate of 19.5% feeble-minded is high and indicates that this group of State Charity cases is made up of very poor mental material. There are at best only 37% of the children who test up to normal. The large per cent. of backward or dull children is typical of groups of dependent children.

(2) *Children's Home Cases.*

The total population of a county children's home was tested with the Yerkes Scale. Here, again, the results are presented as diagnosed by the C. M. A. standard and by the Three Per cent. Hypothesis. In using the C. M. A. standard the following quintile division was used.

	C. M. A.
Very Bright	1.25 and above
Bright	1.10 to 1.25
Normal	.90 to 1.10
Backward	.75 to .90
Feeble-minded	.75 and below

In using the Three Per Cent. Hypothesis the limiting points as computed by Pintner and Paterson were used. The table for these limiting points as revised by the authors is given here.

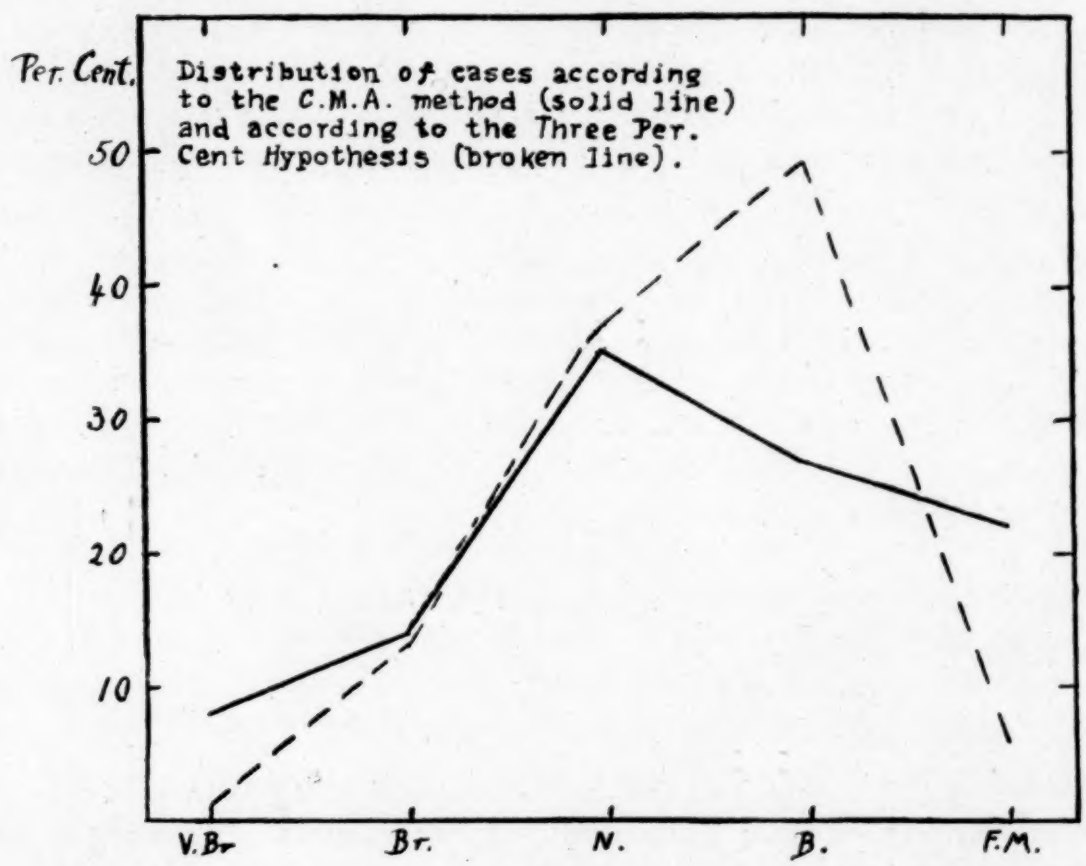
TABLE I

Limiting Points on the Yerkes Scale According to the Three Per Cent. Hypothesis

Age	F. M.	B.	N.	Br.	V. Br.
5.....	Up to 11	—17	—26	—34	35 and above
6.....	" 13.5	—23	—34	—43	44 " "
7.....	" 17	—28	—40	—47.5	48 " "
8.....	" 19.5	—34.2	—47	—57	58 " "
9.....	" 23	—44	—60.5	—70.8	71 " "
10.....	" 39.3	—54	—67	—79.7	80 " "
11.....	" 41.4	—58	—71	—84.6	85 " "
12.....	" 42.6	—64	—85	—92.8	93 " "
13.....	" 44.4	—70	—86	—92.8	93 " "
14.....	" 48.8	—75	—87	—92.8	93 " "
15.....	" 50.5	—77.5	—89		
16.....	" 52.5	—79.5	—90		

The results of the two methods of diagnosis are as follows:

	C. M. A.		3% Hypothesis	
	No.	%	No.	%
Very Bright.....	8	7.5	1	0.9
Bright.....	14	13.2	13	12.3
Normal.....	35	33.1	37	34.9
Backward.....	27	25.2	49	46.2
Feeble-minded.....	22	20.8	6	5.7
Total.....	106	99.8	106	100.0



GRAPH I

Graph I shows the distribution of the cases according to each method. It will be noted that the Three Per Cent. Hypothesis gives a curve much closer to the normal curve than the C. M. A. The curve showing the distribution according to the Three Per Cent. Hypothesis is skewed to the left and the majority of the cases fall in the backward group. The C. M. A. standard shows much the same number of feeble-minded and backward cases. Of course the curves prove nothing, but the distribution of the cases according to the two methods is at least suggestive. Those who are acquainted with the type of child sent to our orphan asylums will be inclined to agree with the writer when he says that the common characteristic of the group of children is their backwardness, due to lack of mentality, bad environment and so forth, rather than marked feeble-mindedness. If we accept the C. M. A. standard of diagnosis, we obtain as large a percentage of feeble-mindedness as the best workers have found to be common among juvenile delinquents. The writer is inclined to believe that feeble-mindedness is not as common among unselected dependents as among unselected delinquents.

A comparison of the State Charity cases with the County Home cases shows a much larger percentage of feeble-minded among the former than among the latter, 19.5 per cent. as contrasted with 5.7 per cent. (taking the most conservative estimate in each case). This is due to the fact, which we have already mentioned, namely, that the State Board receives a great many children who are "problems," children who are for various reasons difficult to manage. We might say that as contrasted with the ordinary children's home, the wards of the State Board are a selected group.

Combining the two groups and taking the most conservative diagnosis in each case, we arrive at the following distribution:

	State Charities	Children's Home	Total	Percent
Very Bright		1	1	0.5
Bright		13	13	6.9
Normal	30	37	67	35.6
Backward	32	49	81	43.1
Feeble-minded	16	6	22	11.7
Doubtful	4		4	2.1
Total	82	106	188	99.9

(3) *Combined Method of Diagnosis.*

In computing the results of the tests of the Children's Home cases, the diagnosis on the C. M. A. method and on the Three Per Cent. Hypothesis was made in each case. This suggested a distribution of the children into a greater number of groups, determined by the agreement or disagreement of these two methods of diagnosis. If both methods give feeble-minded, the case is called F.M.; if one method gives feeble-minded and the other backward, the case is called B.—F.M., which may be interpreted as being on the borderline between backwardness and feeble-mindedness. If both methods give backward the case is called B. If one gives B. and the other N., the group is called B.—N., which again may be interpreted as lying between backwardness and normality. And so on for the other groups of mentality. It is difficult to tell the value of such a method at the present time, but it would seem to be a method whereby the defects or drawbacks of the one method of diagnosis may be checked or equalized by the other method. We give below the Children's Home cases distributed according to this combined method of diagnosis:

	No.	%
Very Bright	1	0.9
Very Bright—Bright	7	6.7
Bright	6	5.6
Bright—Normal	8	7.6
Normal	28	26.2
Normal—Backward	8	7.6
Backward	26	24.5
Backward—Feeble-minded	16	15.1
Feeble-minded	6	5.6
	106	99.8

The insertion of another group between each group of the original quintile division gives a nine-fold classification of the cases. It is interesting to note that of these new groupings, the groups B.—F.M. and V.Br.—Br. receive the relatively largest number of cases, and the new groups around the N. group, i. e. the Bı.—N. and the N.—B. groups a relatively smaller number of cases. This seems to mean that the discrepancy between the two methods of diagnosis is greatest at the upper and lower ends of the distribution. The Three Per Cent. Hypothesis has a tendency to shift the cases in the V.Br. and F.M. groups more toward the center of the distribution. It is merely an indication of the tendency of the Three Per Cent. Hypothesis to approach more nearly a normal curve of distribution.

A Mental Survey of an Institution

The investigation of the children in a County Home grew out of a practical problem that the writer was called upon to solve, namely, to select the feeble-minded children in the Home, so that they might be sent to a more suitable institution. At the beginning of the investigation it was thought that there would not be sufficient time to give the Yerkes-Bridges Point Scale to all the children. This afforded an opportunity to put to the test a theory of the writer's as to the feasibility of employing a group of class tests for a preliminary mental survey of the whole group, after which the poorest, as determined by these class tests, could be given the more thorough examination afforded by the Yerkes or Binet Scale. The plan was to give a certain group of class tests and to rank the children in order of merit on the basis of these tests. The individual mental examination would then be given to as many children as possible, beginning with the lowest in this ranking. This plan, it was thought, would lead most rapidly to the discovery of the feeble-minded in the group without making it necessary to test all the children. In the present case it proved ultimately possible to test all the children with the Yerkes-Bridges Point Scale, so that we can now estimate the usefulness of making a preliminary survey for the selection of suspected cases.[6]

The class tests chosen were such as had been more or less adequately standardized on large numbers of children and among those such as, in the opinion of the writer, seemed most likely to correlate highly with general intelligence. Eight tests were chosen. The time taken to give the tests to a class varied from an hour and a half to two hours. The first five tests were taken from Pyle[7] and given according to his instructions: (1) Rote Memory (for concrete words only). No attention was paid to bad spelling. Credit was given if what the child wrote resembled in any way the test word.

(2) The Digit Symbol Test.—Time limit, 5 minutes.

(3) The Symbol Digit Test.—Time limit, 5 minutes.

(4) Word Building.—Time limit, 5 minutes. The letters used were A, E, I, R, L, P.

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[6] The writer wishes to acknowledge the help given him in this work by his senior students, and, in particular, by Miss Jeanette Reamer and by his wife.

[7] Pyle, W. H. *The Examination of School Children.* Macmillan, 1913.

(5) Opposites.—Time limit, one minute.

(6) Cancellation of "a's." The test blank used was not the same as that used by Pyle. Time limit, one minute.

(7) Directions Test A. No time limit.

(8) Directions Test B. No time limit. The score for the last two tests is the number of directions correctly answered. These two tests were taken from Woodworth and Wells[8] and tentative norms established by the writer were used.

In the first five tests the norms established by Pyle do not extend below age eight. Additional norms for ages six and seven were obtained by the writer from unselected school children.

After these class tests had been given to the children, the scores obtained on each test were turned into equivalent mental ages by reference to the tables of norms. Half and quarter years were interpolated if the actual scores fell in between the norms for any two ages. In this way each child has a number of mental ages according to the number of class tests used. The median of these mental ages is the mental age attained by the child on the basis of the class tests. The mental ages for each test for each child and the median mental ages are given on Table II.

Eighty-eight cases are shown in this Table, *i. e.*, eighteen less than the total number tested with the Yerkes Scale. Some of the children were absent when the class tests were given and some were too young to take the tests. The first line of the table is to be read as follows: Child No. 1 is seven years old and made a performance on the Rote Memory test about equal to an average five-year-old child, on the next four tests the performance was about equal to an average six-year-old, on the Cancellation test about equal to a five-year-old, on Directions Test A to a seven-year-old, on Directions Test B to a six-year-old and the median mental age as derived from all these tests is six.

For some of the tests at some ages no norms were available and therefore no mental age could be assigned to the child's performance on the test.

In order to find out how closely the ranking of the children on the class tests corresponded to their ranking on the Yerkes Scale the intelligence quotient for the class tests and the coefficient of mental ability for the Yerkes Scale were computed.

[8] WOODWORTH, R. S., and WELLS, F. L. *Association Tests.* Psychological Monographs, Vol. 13, 1911. Whole No. 57.

TABLE II

Mental Ages on Class Tests

No. of Case	Age	Rote Mem.	Digit Symbol	Symbol Digit	Word Bldg	Oppo-sites	Cancel-lation	Direc-tions A	Direc-tions B	Median M. A.
1	7	5	6	6	6	6	5	7	6	6
2	7	7.25	6	6	7	6	7.5	6.5	5	6.25
3	7	7	6	6	7.5	7	6.5	7	7	7
4	7	7.5	7.5	8.25	8	7.25		8.5	8.5	8
5	7	8	6	6	7	7.25		7.75	8.5	7.25
6	8	6	7	6	6	6	5	7	6	6
7	8	6.5	7.5	6	6	6	5.75	6.5	5	6
8	8	—4	7	6	6	6	5			6
9	8	7	7.5	7.25	7.5	7.25	6		6	7.25
10	8	7.5	7	6	7.5	7	8	7.5	8	7.5
11	8	7.5	7.5	7.5	7.5	7.5		8.5	8.25	7.5
12	8	6	7	6	6	6	8	7.5	8.25	6.5
13	8	7.25	7.5	7.5	7.5	7.75		8.5	8.25	7.5
14	8	7	7.5	7.5	7.5	7				7.5
15	8	7.5	7.5	7.5	7.5	7.75	6.5		8.5	7.5
16	8	7.5	8.75	8.5	7.5	7.75		8.5	7.25	7.75
17	8	7.5	7.5	7.5	8	7.5	8		8.5	7.5
18	9	7.5	7	6	7.25	6	7	7.25	7	7
19	9	5	7.5	7.5	6	11	5		5	6
20	9	7.5	7.5	6	7	6	7.5	7.75	8.25	7.5
21	9	7.5	7	6	6	6		7.5	7.5	7
22	9	7.5	7.5	8	7.5	7.5		10	8.5	7.5
23	9	7.5	7.5	7.5	7.5	7.5	6		7.75	7.5
24	9	7.5	7.5	7.5	8	8		8.25	8	8
25	9	8	6	7.5	8	8		13.5	8.5	8
26	9	8	8.5	9	9	10		13.5	15	9
27	10	6.75	7.5	7.5	7	7		8.5	7	7
28	10	7	6	6	7.5	6	8	7.5	7.5	7.25
29	10	7.5	6	6	7	10.5	8	7.25	7	7.1
30	10	7.25	7.5	6	7.25	6		7.75	8.25	7.25
31	10	7.25	7.5	7	8	7.5		8.25	8.5	7.5
32	10	6	7.5	7.5	7.5	7.25			8.5	7.5
33	10	7	7	7	7.5	7.5	8	8.5	8.5	7.5
34	10	7.5	7.5	7.5	7.25	7.5	7	7.25	7.5	7.5
35	10	8	9	8.75	9.5	7.5		8.5	8.5	8.5
36	10	10.5	7.5	7.5	7.75	7.75	7	8.25	8	7.75
37	10	7	7.5	8.5	7.25	7.5			8	7.5
38	10	7.5	8	8.75	9	7.5		10	8.75	8.75
39	10	7.5	12	12.5	7.5	9	6	8.5	8.75	8.6
40	11	6.5	7.5	7.5	7	7.25	6.5		6.25	7
41	11	6.5	7	7.5	6	6	5.5	7.25	6.25	6.3
42	11	6	6	7	7	6	6.5	5	5	6
43	11	6.25	7.5	7.5	7.5	7			8.5	7.5

TABLE II

Mental Ages on Class Tests

No. of Case	Age	Rote Mem.	Digit Symbol	Symbol Digit	Word Bldg.	Opposites	Cancellation	Directions A	Directions B	Median M. A.
44	11	7.5	8.5	8.25	8			7.5	7	7.75
45	11	6	7.5	7.5	8	7.25		7	7.25	7.5
46	11	10	7.75	7.5	8	7.5			8.5	7.8
47	11	8	8	7.75	9	8		8.5	8.5	8
48	11	10.5	7.75	9.5	8	7.5		8.75	8.5	8.5
49	11	10.5	9	8.75	7.5	7.5	8	8.5	8.25	8.3
50	11	7.5	9.5	9.5	9	7.5		8.75	8.5	8.5
51	11	10.5	8	8.75	7.5	7.5	6.25	10	9	8.4
52	11	13.5	8.5	12	8	14		8.75	8.5	8.75
53	11	10.5	8.5	11	7.5	7.25		10	11.5	10
54	11	12	8	7.5	9	8		8.5	11.5	8.5
55	11	12	11.5	16	8	10		10	11.5	11.5
56	12	10.5	7.75	11.5	7.5	12		8.5	8.5	8.5
57	12	7.5	9	12.5	7.25	7.75		10	9	9
58	12	7.75	7.5	7.5	8	7.75		8.5	8.5	7.75
59	12	7.25	8.75	8.5	7.5	7.5		8.5	8.5	8.5
60	12	8	8.75	11.5	9.5	9		10	8.75	9
61	12	11	9.25	9.75	10	7.5		13.5	8.5	9.75
62	12	17.25	17	18	13	12		13.5	15	15
63	12	14	9	12.5	12	13		16	11.5	12.5
64	12		11.5	12	8	10.5		16	15	11.75
65	13	7.75	7.5	7.5	8	7.5	6.5	8.5	7.5	7.5
66	13	7.5	7.75	8.5	7	7.5	7.5	8.5	8.25	7.5
67	13	7	7.5	7.5	7.5	7.25	8		8.5	7.5
68	13	7.5	11.5	9.5	7.5	7.5		8.5	9	8.5
69	13	8	7.5	7.75	7.5	7.25			8.5	7.6
70	13	7.75	13.5	13	8	7.5		8.5	8.75	8.5
71	13	7.75	7	9.5	9.5	9		10	11.5	9.5
72	13	7.5	7	7	7	7.5		7.5	8.5	7.5
73	13	17.5	12.5	13.5	10.5	8		10	15	12.5
74	13	7.25	9.5	10.5	9.5	9		10	Ad.	9.5
75	13	17.5	12.25	14.5	9.5	8		10	15	12.25
76	14	10.25	12	9.25	10.5	10		13.5	15	10.5
77	14	7.5	9	10	7.25	7.5		8.5	8	8
78	14	7.75	8.75	10.5	9	7.25		8.5	8.5	8.5
79	14	7.5	11.5	12.5	7	7.5		8.5	8.5	8.5
80	14	7	7.75	7.75	7.25	7.5		8	8.5	7.75
81	14	10.5	8	11	8	8		13.5	11.5	10.5
82	14	7.5	7.25	8.75	7	7.25		8.5	8.5	7.5
83	14	7.5	7.5	9.5	7.75	9		10	9	9
84	14	7.5	12.25	13.5	8	7.5		13.5	Ad.	12.25
85	15	7.5	7.5	7.5	7.5	8		8.5	7.25	7.5
86	15	7.25	8.75	12.75	7	7.5		8.75	8.5	8.5
87	16	10.5	9	13.5	8	11		13.5	15	11
88	16	18	12.5	Ad.	14	13		16	Ad.	16

TABLE III

Class Tests and Yerkes Scale

Number of Case	Class Tests Med. M. A.	I. Q.	Yerkes Scale M. A.	C. M. A.	Difference
1	6	.87	5.8	.82	—.05
2	6.25	.91	8.24	1.23	+.32
3	7.0	1.00	8.4	1.29	+.29
4	8.0	1.16	8.5	1.32	+.16
5	7.25	1.05	10.4	1.62	+.57
6	6	.75	5.0	.56	—.19
7	6	.75	6.8	.84	+.09
8	6	.75	7.8	.97	+.22
9	7.25	.91	8.0	1.00	+.09
10	7.5	.94	8.24	1.08	+.14
11	7.5	.94	8.3	1.10	+.16
12	6.5	.81	8.56	1.18	+.47
13	7.5	.94	8.56	1.18	+.24
14	7.5	.94	8.64	1.20	+.26
15	7.5	.94	8.8	1.26	+.32
16	7.75	.97	9.28	1.38	+.41
17	7.5	.94	9.28	1.38	+.44
18	7.0	.78	8.2	.79	+.01
19	6.0	.67	8.24	.81	+.14
20	7.0	.78	8.5	.86	+.08
21	7.0	.78	8.64	.90	+.12
22	7.5	.83	8.72	.92	+.09
23	7.5	.83	9.28	1.04	+.21
24	8.0	.89	9.42	1.07	+.16
25	8.0	.89	10.0	1.13	+.24
26	9.0	1.00	10.8	1.21	+.21
27	7.0	.70	8.08	.62	—.08
28	7.25	.72	8.2	.70	—.02
29	7.1	.71	8.32	.73	+.02
30	7.25	.72	8.4	.75	+.03
31	7.5	.75	8.5	.76	+.01
32	7.5	.75	8.5	.76	+.01
33	7.5	.75	8.72	.81	+.06
34	7.5	.75	8.72	.81	+.06
35	8.5	.85	9.0	.88	+.03
36	7.75	.77	9.28	.91	+.14
37	7.5	.75	10.0	1.00	+.25
38	8.75	.87	11.3	1.13	+.26
39	8.6	.86	13.5	1.29	+.43
40	7.0	.64	6.0	.45	—.19
41	6.3	.57	6.4	.48	—.09
42	6.0	.55	8.32	.67	+.12
43	7.5	.68	8.5	.70	+.02
44	7.75	.70	8.64	.74	+.04

TABLE III

Class Tests and Yerkes Scale

Number of Case	Class Tests Med. M. A.	I. Q.	Yerkes Scale M. A.	C. M. A	Difference
45	7.5	.68	8.72	.75	+.07
46	7.8	.71	8.8	.77	+.06
47	8.0	.73	9.42	.86	+.13
48	8.5	.77	9.84	.91	+.14
49	8.3	.76	11.0	1.00	+.24
50	8.5	.77	11.1	1.01	+.24
51	8.4	.76	11.1	1.01	+.25
52	8.75	.80	11.7	1.11	+.31
53	10.0	.91	11.9	1.14	+.23
54	8.5	.77	12.5	1.15	+.38
55	11.5	1.05	15.5	1.27	+.22
56	8.5	.71	9.6	.77	+.06
57	9.0	.75	9.84	.78	+.03
58	7.75	.65	10.6	.84	+.19
59	8.5	.71	11.4	.92	+.21
60	9.0	.75	11.9	.99	+.24
61	9.75	.81	11.9	.99	+.18
62	15.0	1.25	14.0	1.05	—.20
63	12.5	1.04	17.0	1.14	+.10
64	11.75	.98	Ad.	1.24	+.26
65	7.5	.58	7.2	.47	—.11
66	7.5	.58	8.64	.63	+.05
67	7.5	.58	8.88	.68	+.10
68	8.5	.65	9.0	.70	+.05
69	7.6	.59	9.42	.74	+.15
70	8.5	.65	10.6	.84	+.19
71	9.5	.73	11.0	.86	+.13
72	7.5	.58	11.3	.90	+.32
73	12.5	.96	11.9	.99	+.03
74	9.5	.73	11.9	.99	+.26
75	12.25	.94	13.25	1.02	+.08
76	10.5	.75	9.42	.70	—.05
77	8.0	.57	9.56	.72	+.15
78	8.5	.61	10.4	.78	+.17
79	8.5	.61	10.4	.78	+.17
80	7.75	.55	10.6	.79	+.24
81	10.5	.75	10.5	.80	+.05
82	7.5	.54	11.6	.90	+.36
83	9.0	.64	11.6	.90	+.26
84	12.25	.87	11.9	.93	+.06
85	7.5	.50	8.64	.59	+.09
86	8.5	.57	8.72	.60	+.03
87	11.0	.69	11.9	.89	+.20
88	16.0	1.00	18+	1.06	+.06

The I. Q. (Intelligence Quotient) is obtained by dividing the mental age by the chronological age, and the C. M. A. by dividing the score obtained by the average score for the age in question. Each may be said to express the "percentage of normality" for the intelligence of the child, 1.00 being normal.

Table III shows the comparison between the class tests and the Yerkes scale. Column 1 gives the number of the case; column 2 the median mental age on the class tests; column 3 the intelligence quotient of the class tests; column 4 the mental age on the Yerkes Scale; column 5 the C. M. A. on the Yerkes Scale; and the last column the difference between the C. M. A. and the I. Q., the positive sign indicating a difference in favor of the C. M. A.

It will be noted that the mental ages as determined by the class tests are in most cases lower than those arrived at on the Yerkes Scale. In fact, there are only nine cases which test lower on the Yerkes Scale than on the class tests, that is, 79 out of the 88 cases show a somewhat higher C. M. A. on the Yerkes Scale than an Intelligence Quotient on the class tests. If the Yerkes Scale gives a reliable mental age, then the class tests, with the present standardation, are obviously a little too severe. The almost uniform tendency of the class tests to rate the subjects lower than the Yerkes Scale does not, however, make them invalid for our purpose since they are merely to be used to determine the relative standing of the children. That the ranking of the cases is much the same by the class tests as by the Yerkes Scale is shown by the correlations.

The correlations for each age group computed by the Spearman Foot-Rule Method are as follows:

Age	R	r	P. E.
8.....	.60	.81	.0486
9.....	.77	.94	.0256
10.....	.74	.92	.0256
11.....	.79	.95	.0256
12.....	.54	.75	.0688
13.....	.53	.74	.0688
14.....	.17	.26	.1295

These are fairly high in almost all age groups, except in age fourteen. The correlations between the class tests and the Yerkes Scale of all the 88 cases together is, R=.59; r=.80 with a P. E. of about .0280. This coefficient is naturally high because we are dealing with a heterogeneous group including children varying from age 8 to age 14.

Practical Advantages of Class Tests

We shall now discuss the practical advantage of having a rough grading of the children on the class tests in order to make a selection for individual tests, and see how this actually works out in practice. The psychologist who is called upon to select the feeble-minded in an institution rarely has the time to test all the children, and unless he is making a thorough investigation, it would be needless for him to do so. He may follow two methods in selecting a limited number of children to be tested: (1) according to the choice of the superintendent or teachers; (2) according to his own choice. The efficacy of the latter method is, of course, dependent upon the thoroughness with which he goes over the cases. It may vary all the way from a brief visit in the school room, during which two or three children are selected for examination, to a special interview with each child. We can scarcely compare this method with the results of the selection by class tests. It is too variable a quantity. If the selection is rapidly made it will be faulty; if the individual interview is long, we approach a kind of mental examination of each case.

The other method of selection, *i. e.*, by the superintendent or teachers, can be tested with our data. Before the testing was begun the superintendent of the Home submitted a list of the children whom he suspected of backwardness or feeble-mindedness. There were 23 in this list. We may now compare this selection of 23 with the lowest 23 as determined by the class tests. If we had followed the superintendent's advice, we should have tested the 23 of his selection; if we had followed the class tests we should have tested the 23 lowest as chosen by their I. Q's. Below is given the distribution of these two methods of selection arranged according to the combined method of diagnosis:

	Superintendent's Selection		Class Tests	
	No.	%	No.	%
Feeble-minded	3	60	5	100
Feeble-minded—Backward	6	46	7	54
Backward	5	22	8	35
Backward—Normal	1	14	3	43
Normal	6	30		
Normal—Bright	1	14		
Bright				
Bright—Very Bright	1	14		
	23		23	

Comparing the two methods of selection we note that by the superintendent's selection only 60% of the feeble-minded would have been detected, whereas by the class tests every one would have been examined. In the F.M.—B. class 46% would have been detected by the superintendent's selection, and 54% by the class tests. In the B. and B.—N. classes the class tests give a higher percentage in each case. In brief a much higher percentage of all those below normal would have been examined on the selection made by the class tests. Conversely eight children testing normal or above would have been examined on the superintendent's selection, and this work may be regarded as so much waste of time if the sole object had been to detect the cases of lowest mentality. This waste may be represented as follows according to the end desired by the examination:

	Superintendent		Class Tests	
	No.	% of 23 cases	No.	% of 23 cases
All Normal and above called superfluous	8	34	None	
All Backward—Normal and above called superfluous	9	39	3	13
All Backward and above called superfluous	14	61	11	47

This comparison is not exactly fair if we put it in terms of actual time spent in testing, since we must not forget that the giving of the class tests takes a considerable time. Let us therefore attempt a comparison in terms of actual time. Supposing that it will take two days to test 23 children on individual scales, then this amount of time would have been spent in testing the 23 cases selected by the superintendent. It would take a day to test the children on the class tests, and the second day might be devoted to the examination of say eleven cases, *i. e.*, half of twenty-three. This would give two days devoted to examination in each case. The results would be as follows:

	Superintendent		Class Tests	
	No.	%	No.	%
Feeble-minded	3	60	4	80
Feeble-minded—Backward	6	46	4	31
Backward	5	22	1	43
Backward—Normal	1	14	2	29
Normal	6	30		
Normal—Bright	1	14		
Bright				
Bright—Very Bright	1	14		

Again the class tests method, in spite of the fact that only half the children have been examined individually, gives a larger percentage of feeble-mindedness, but it shows a lower percentage of the F.M.—B. group. The percentage in the backward group is in favor of the class tests. It would seem, therefore, that as far as actual time is concerned, the class test method has given as good, if not better, results than the method of relying on another's subjective judgment of the mentality of the children. In general the question of time is not likely to be as acute as we have represented it here and the examiner will, as a rule, prefer the more reliable method even although it may take a day or two longer.

Naturally all that we have said above is in regard to one superintendent's choice, and is not to be taken as a sample of what every superintendent will do. Those who are acquainted with superintendents of Children's Homes and similar institutions will recognize from the results given that the superintendent in question was distinctly above the average in his knowledge of the problem of mental deficiency. His selection is good and shows a knowledge of his wards. There are very few superintendents, I think, who would have been able to do better. The necessity for a preliminary survey by class tests will, therefore, apply with much greater force to institutions in which the superintendent has little knowledge of the problem of mental deficiency.

Assuming that we are using the class test method for a preliminary survey, we may raise the further question as to what proportion of the children should be tested later by individual tests. No dogmatic answer can be given to this question and in actual practice it will be largely a question of the time at the disposal of the examiner and the thoroughness with which the mental survey is to be made. We give below the results that would have been obtained under the following conditions: (1) if the lowest one-eighth of the children had been tested; (2) if the lowest one-fourth had been tested; (3) if the lowest one-third had been tested; (4) if the lowest one-half had been tested.

(1) If the lowest one-eighth had been tested, there would have been eleven children (with Intelligence Quotients on the class tests from .50 to .58). Their distribution on the basis of the Yerkes Scale gives:

Feeble-minded	4 or 80 per cent. (i. e. 1 not detected)
Feeble-minded—Backward	4 or 31 per cent.
Backward	1 or 43 per cent.
Backward—Normal	2 or 29 per cent.

Even taking such a small number we find that the class tests account for a very large percentage of the feeble-minded.

(2) If one-fourth had been tested, there would have been 22 cases (with I. Q. below .69) distributed as follows on the Yerkes Scale:

Feeble-minded	5 or 100 per cent.
Feeble-minded—Backward	7 or 54 per cent.
Backward	7 or 31 per cent.
Backward—Normal	3 or 43 per cent.

This includes all the F.M. group and about half the F.M.—B. group.

(3) If one-third had been tested, there would have been about 29 cases (with I. Q. below .72) and they would have distributed themselves as follows, on the Yerkes Scale:

Feeble-minded	5 or 100 per cent.
Feeble-minded—Backward	10 or 78 per cent.
Backward	10 or 43 per cent.
Backward—Normal	3 or 43 per cent.
Normal	1

This includes all the F.M. group and all but three of the F. M.—B. group. These three cases had I. Q's somewhat above .71. We give the main figures for these three cases:

1. I. Q. on Class Tests=.75. C. M. A.=.70. Chron. Age=14.
2. I. Q. on Class Tests=.75. C. M. A.=.56. Chron. Age= 8.
3. I. Q. on Class Tests=.72. C. M. A.=.70. Chron. Age=10.

(4) If one-half of the children had been tested, there would have been 46 cases. It would have been necessary to take 46 instead of 44, because there was a group with the same I. Q's on the class tests. These 46 cases have I. Q's below .76. The distribution on the Yerkes is:

Feeble-minded	5 or 100 per cent.
Feeble-minded—Backward	13 or 100 per cent.
Backward	20 or 87 per cent.
Backward—Normal	3 or 43 per cent.
Normal	5 or 25 per cent.

If the lower half of the cases as determined by the class tests had been tested all the cases of feeble-mindedness, even on the liberal basis of .75 C. M. A., would have been detected, and in addition almost all the definitely backward. Furthermore, the

waste of time involved in testing normal children or children above normal would seem to have been reduced to a minimum.

It would seem to me, therefore, that a group of well standardized class tests would form an excellent means for the first rough grading of children according to their mentality and, indeed, an excellent method for carrying out mental surveys on a larger scale. We are working on this problem at the present time and hope shortly to arrive at a well standardized group of class tests for the testing of large groups of individuals.

COMMUNICATIONS AND DISCUSSIONS

DIRECTED ATTENTION AND LEARNING

A number of experimental investigations of memory have shown that the beginning and the end of a series of syllables or of a selection of poetry are learned more rapidly than is the middle. Since this is the case, it would seem possible that the general efficiency of learning might be improved by directing the learner's attention to the middle of the material, the part least strongly impressed, allowing the ends to take care of themselves as they appear to do. The work here reported was undertaken to test this suggestion, which is due to Professor D. K. Fraser.

Three kinds of material were used in the experiment: nonsense syllables, Chinese vocabularies, and poetry. The method of procedure was a combination of the method of complete mastery and savings with the method of helps in the case of nonsense syllables and poetry, and with the method of right associates in the case of the vocabularies. The procedure was so arranged that it showed the distribution of errors between the various parts of the series. Retention was tested only for a period of one day.

Attention to the middle of the series was obtained by the instructions: "You are to attend particularly to the middle of the series and try especially to learn it." The part to be attended to (the middle third) was marked by a line drawn on the left of the printed series. Normal series were obtained for comparison, using the instructions: "Do not attend to any special part of the series."

Three observers took part in the experiment. Two of these were untrained in psychological observation. Their gross results were extremely variable; increases and decreases in efficiency with directed attention, most of them trivial, were scattered promiscuously among the various measures obtained. But an examination of the distribution of errors within the series by these observers showed that with neither of them were the instructions to attend to the middle effective in securing better learning of the middle. This conclusion is borne out by their introspections. The results of these observers were therefore useless for our problem.

But in the case of our third observer, who was trained in psychological observation, the instructions to attend to the middle were effective in securing better learning of the middle of the series, as

evidenced both by the distribution of errors and the observer's introspective report. Moreover, the results of this observer are quite definite. Attention to the middle of a series of nonsense syllables resulted in a considerable improvement both in learning and in remembering, there being a decrease in the number of errors as well as in the number of repetitions required to learn and relearn the directed as compared with the normal series. This decrease ranges from twenty to fifty per cent. There is also a gain in efficiency in the case of poetry, but it is not so great. With Chinese vocabularies, however, concentration on the middle of the series resulted in a small loss of efficiency. The gain at the middle of this non-serial material did not compensate the loss at its ends.

These results show that special attention to the middle of a series, when it can be obtained, is of advantage in learning serial material, but not in learning material of a non-serial nature. The results for the one observer for whom the method was effective are so clear-cut that they warrant further investigation, either by the further use of trained observers or by other methods of directing attention to the center.

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ABSTRACTS AND REVIEWS

HAROLD O. RUGG. *The Experimental Determination of Mental Discipline in School Studies.* Baltimore: Warwick and York, 1916. Pp. 132. $1.25.

Dr. Rugg has made an important contribution to the solution of the problem of formal discipline by making an investigation of the transfer-effects of a school study itself. His purpose was to ascertain whether the training in visualizing obtained from a semester's course (15 weeks) in descriptive geometry improved the ability to visualize in related fields of work, and if so, to what extent. The training was the regular course in that subject required of all freshmen in the College of Engineering in the University of Illinois. The course, which should not be confused with the usual plane and solid geometry, has for its purpose "to build up for the student a method of picturing solid objects (*e. g.*, machines like engines, dynamos, their constituent parts, and the diverse materials used in engineering of all sorts) on one plane called the plane of projection, and coincident with the drawing paper." From experience in teaching the subject Dr. Rugg came to the conclusion that it gave a very thorough training in the visual imagining of geometrical objects. The training subjects were 326 freshmen in this course, the control subjects were 72 juniors and seniors in the School of Education, and 15 Engineering freshmen not taking descriptive geometry.

The six tests designed to measure the spread of training were of three types: (1) *tests with non-geometrical elements.* These were (a) ten examples in short division, such as, "Divide eighty-one by seven" (time 60 secs.); (b) ten examples in short division, such as, "Divide thirty-four fifty-two by nine" (time 90 secs.); and (c) form as many words as possible out of the word 'material'" (time 5 mins.). (2) *Tests with quasi-geometrical elements.* The subjects were asked to tell the number of straight lines required to write each of twelve words, using a straight-line alphabet shown for a short time just before the test (time 75 secs.). (3) *Tests with strictly geometrical elements.* (a) A three-inch cube painted white on all sides is cut into one-inch cubes. How many cubes have paint on three sides, how many on two, on one, on no sides? (Time 80 secs.). (b) Form a mental picture of each of the following objects in turn, and count the number of straight lines it would take to construct each in space. Then follow 8 problems, such as, (1) A wedge. (2) Four triangles

attached to a square, bases coinciding with the sides of the square. (5) A triangular pyramid resting on a triangular prism, bases coinciding. (Time 90 secs.)

These six tests were given to both training and control subjects before and after the course in geometry. In the pre-training tests the training subjects did substantially better than the controls. In the post-training tests both groups improved, but the training subjects made 7.44% greater gain in efficiency (number done correctly) than the control subjects in the non-geometrical tests, 20.4% greater gain in the quasi-geometrical test, and 31.25% greater gain in the strictly geometrical tests. Statistical analysis showed that the superiority was well distributed throughout the training group.

The author thinks these excess gains of the training group are due to training, principally in visualization, received in the course in geometry. The tests are framed to test principally visualization, and the other courses taken concurrently with the geometry offer no training in visualization at all comparable with that offered by the geometry. Granting this, we are somewhat in doubt how large the gains are, since the question is, what proportion of the gains in training was transferred, and the improvement in visualization in training was not measured. The author regards all three gains as "substantial."

Opinions will differ as to importance of these transfers according to the extent to which the training and the tests are thought to resemble each other. The causes of transfer throw some light upon the matter. (1) The course in geometry developed a stock of imagery concepts (lines, squares, triangles, prisms, etc.), a familiarity with them, and a skill in manipulating them, which was of direct aid in the painted cube test, and in counting the edges of the figures in the last test. (2) The course increased the span of attention, enabled the person to hold more elements in mind at once, and for a longer time. Its effect was noted in the short division tests even. (3) The course is essentially a course in problem-solving, and tends to make the person conscious of the value of a good method of attack, hence to make him inclined to seek one in any of the tests. I am disposed to think there is a strong resemblance in content between the course and the tests with strictly geometrical elements, but not much between it and the other tests. The transfer factors in these other tests seem to be notions of procedure, and a better control of attention.

On the whole the investigation shows that the training, principally in visualizing, received from the course in geometry is used in other fields, usually reckoned somewhat different. The decrease as the tests become more different from the training is of course significant. The results afford, in the opinion of the author, and it seems to me justified, some support for a considerably restricted view of formal discipline. The book contains excellent tabular summaries and critical analyses of all the experiments to date. The statistical handling of the results, a feature we have not done justice to, is the best of all the researches on the subject yet published.

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EDITORIALS

FROM VOCATIONAL SELECTION TO VOCATIONAL GUIDANCE

The economic issue is often the determining factor in human betterment. The educational world will see a striking illustration of that in the next few years, in that the now rapidly growing movement in the direction of scientific vocational selection at the entrance to industrial and various other types of employment will force upon the school system the necessity of making that selection at the beginning of vocational training, where such is furnished, in order not to sacrifice the training through misdirection.

It will soon be known that, when a youth knocks at the door of professional industry, questions will be asked as to his fitness. If a vocational school prepares for the various crafts, arts, and other forms of skillful activity in a large city, the tax payer has a right to know whether or not the children who enter upon a course of training are by nature fitted for the occupation to which it will lead. Thus, the purely economic issue, quite regardless of interest in the child, will force upon as applied psychology in the determination of fitness for

occupations in the early stages of vocational training. The educational psychologists, therefore, face a very specific issue for the next few years, namely, that of standardizing tests for specific occupations, not by sporadic use of what happens to be at hand when a community must be served, but by years of intensive and persistent coöperation in the attack upon a few of the most promising points of vantage.

A good example of this to start with would be that of fitness for stenography. Work in this field has been done in several places, but on the mistaken notion that you could pick up floating tests of intelligence, association, and reaction time and proceed to guide. Against this we must enter a most sincere protest in the interest of the integrity of applied psychology. Psychology must learn from physics and medicine that it must first solve its problems in the laboratory, and take time to do this with scientific honesty, before it can formulate rules for practice.

C. E. S.

MILITARY TRAINING AND THE SCHOOLS

Many well-meaning people, realizing the nation's lack of preparedness for self-defense, and seeing in the high schools groups of youths that are easily accessible, are clamoring for military training in the schools. In many communities and in some states such training has been made obligatory by law. There is undoubted need for a more effective mobilization of the nation's strength in critical times like the present, but we believe that it is unjust, unwise and inefficient to lay the burden of military training upon high schools.

It is unjust, because it involves an undemocratic discrimination. If military training means anything it means greater readiness for war. But in a democratic state war is the concern of every citizen, and preparation for it is not a matter to be relegated to the few selected youths that attend the high schools. Universal training is the only way to meet the needs of democracy, and the recent action of Congress on the selective draft bill gives official sanction to this policy.

It is unwise, because no one at the present time knows what military training might profitably be given in high schools. The conditions of waging war have undergone such change that traditional military tactics are obsolete. The one definite conclusion emerging from the chaos of accounts is that parade-ground drill and close formation tactics have little place in actual war. The activities required seem

to be those of digging like a mole, crawling like an Indian, shooting a rifle with periscope sights, handling a machine gun, using a gas mask, living in dug-outs, and especially enduring nonchalantly the most deafening and destructive artillery bombardment. High school boys might be trained in some of these things, but military authorities are agreed that such training demands camp life and the undivided time and energies of the men, and is incompatible with the finely divided high school program. Moreover, high school boys of fourteen to eighteen years of age are too immature to be subjected to intensive training of this sort. Much more could be accomplished in a shorter time, if the military training were postponed to the age of nineteen or twenty.

It is inefficient, because it distracts attention from the true function of the schools, which is to prepare each pupil to render the greatest possible service in both peace and war. Success in war is a matter of organization, of railroads, of steamships, of air planes, of food, of raw materials, but above all things it is a matter of highly developed and well-directed human intelligence. Instead of the ridiculous spectacle of some thousands of high school boys strutting about for a few periods each week with guns on their shoulders, we should see both elementary and high schools articulated with a national system of defense for the attainment of the most complete physical, intellectual and social development of each pupil. This should include provision for physical education, personal and group hygiene, sanitation, dietetics, the most important sciences, and the social, economic and historical background of our present-day life. But this will not be enough. The state must see to it that no boys are given working papers and allowed to shift for themselves at the age of fourteen, fifteen or sixteen. The individual aptitudes, capacities and interests of each boy and girl must be scientifically studied, and each must be well started on the road to permanent productivity under the auspices of a bureau of vocational guidance and national conservation. Thus, whether for peace or war, each citizen will be trained in the service he can best render the state, and the state will know just what individuals should be called upon for any particular service. Then, when war is declared, instead of the present bickering and dilly-dallying, each will go at once to his post, and the entire nation can be mobilized for effective action within a few weeks.

J. C. B.

NOTES AND NEWS

Readers of the JOURNAL will recall that in the December number Dr. J. Crosby Chapman, of Western Reserve University, criticized the method of evaluating blanks in completion tests on the basis of the frequency with which degrees of difficulty were specified by the different subjects, and suggested that the most direct method "would be to measure the actual time taken by all the subjects for the completion of each of the elisions and on the basis of these times to define the values of the difficulties." An extract from a personal letter by Professor Irving King, of the University of Iowa, will be of interest in this connection. Professor King writes, "We experimented extensively with this method of measuring different degrees of difficulty and finally abandoned it as quite incapable of yielding accurate results, for the simple reason that in filling such elisions it is impossible to determine the separate time for each elision. The subject does not work with one elision at a time but on several at once, looking ahead and getting suggestions for the one directly in the focus. The effort could not be isolated for one elision at a time. The problem presented by a sentence containing several difficult elements was solved as a whole, not element by element."

Declaring that better educational results can be secured in California for the money now expended on education, and that an attempt will be made to demonstrate the fact, Director Herbert W. Clark, of the Taxpayer's Association of California, has announced the creation by the Association of a special Bureau of Educational Investigation, which will immediately undertake a thorough analytical survey on a state wide basis. The survey will be conducted by Mr. Wilford E. Talbert, who for the past three years has been director of reference and research of the Oakland public schools. The services of Professor Ellwood P. Cubberley, of Stanford University, as consulting expert have been secured. It is stated that the purposes of the survey are constructive, not destructive, and that the attempt will be made to bring to the taxpayers a clearer realization of the value of good schools and to secure the best educational results for the money expended. A survey conducted on this high plane of public service should be productive of significant results for education not only in California but in the country as a whole.

Under the auspices of the National Committee for Mental Hygiene a survey of mental defectives in the state of Kentucky has been authorized by the state commission on the feeble-minded. The survey will be conducted by Dr. Thomas H. Haines, professor of nervous and mental diseases at Ohio State University and director of the State Bureau of Juvenile Research. Dr. Haines has been granted a five months' leave of absence from his duties in Ohio.

The fourth annual conference on educational measurements was held at the University of Indiana, April 20 and 21. The speakers from abroad were Professor G. D. Strayer, Teachers College, Columbia University, and Dr. C. H. Judd, director of the school of education of the University of Chicago. Professor Strayer spoke on the "Scoring of School Buildings," "Standardizing the School Plant," "Significance and Present Status of the Survey Movement," and "Practical Improvement in General School Administration Resulting form the School Survey." The titles of Dr. Judd's addresses were "Reading Tests," "Experiment in Education," and "Practical Results Obtained through the Use of Standardized Tests in School Achievement." Other papers presented were "A Study of Handwriting (Ayres Scale)," by Professor William W. Black; "A Study of Reading (using Gray Oral and Silent Tests) in Indiana Cities," by Cecile W. White; and "A Study in Arithmetic (Courtis Tests, Series B) in Indiana Cities," by Dean H. L. Smith.

Mr. S. A. Courtis, supervisor of educational research, Detroit Public Schools, invites the coöperation of superintendents and supervisors in an investigation of the efficiency of different methods of teaching reading to be undertaken in May of this year. Mr. Courtis has devised a special reading test for this work and desires to secure as much data as possible on the reading of the grades from the second to the sixth. The test is a rate test and not a reading scale. The difficulty of the questions is about equal to Difficulty 5.5 of the Thorndike Scale. The materials of the test will be furnished at cost, and a bulletin of results and standards will be sent free to those who contribute scores. Tabulations of the results will begin about July 1 and will be ready for use at the opening of school in September. Those who are interested should write immediately to Mr. S. A. Courtis, 82 Eliot Street, Detroit, Michigan.

Friends and admirers of the late Professor Hugo Münsterberg have purchased, and presented to Harvard University as a memorial, his extensive private library on psychological subjects. The library consists of about ten thousand books, reprints, pamphlets, manuscripts, charts and other papers, including the latest and most valuable works on experimental and applied psychology.

The board of trustees of Teachers College, Columbia University, has approved the proposal to endow a scholarship or fellowship in the college to the memory of "Naomi Norsworthy, a woman of the finest personality, a scholar of exceptional ability, and a teacher of surpassing merit."

At the recent meeting of the department of superintendence of the National Education Association held in Kansas City Dr. Thomas E. Finnegan, deputy commissioner of education of the State of New York, was elected president for the ensuing year. The next meeting will be held at Atlanta, Georgia.

A leave of absence for the first half of the academic year, 1917–18, has been granted to Assistant Professor Walter Fenno Dearborn, of the department of education of Harvard University.—*School and Society.*

In the department of education at Smith College, Assistant Professor H. G. Townsend has been advanced to the grade of associate professor, and Dr. Edna A. Shearer to the grade of assistant professor. —*School and Society.*

Dr. Marion R. Trabue has been appointed assistant professor of education in Teachers College, Columbia University.

PUBLICATIONS RECEIVED

BENJAMIN F. ANDREWS. *Registration and Student Records for Smaller Colleges.* Bulletin, 1916, No. 33. Washington: Bureau of Education, 1916. Pp. 67. Ten cents.

A general consideration of the problem of keeping student records is followed by specimen blanks for use before entrance, at entrance, and during the college course.

EDNA BRYNER. *Dressmaking and Millinery.* Cleveland: The Survey Committee of the Cleveland Foundation, 1916. Pp. 133. Twenty-five cents.

The report considers work for women in the sewing trades, the relative importance of these trades, working conditions, wages and character of present day dressmaking, the millinery business and conditions of work in it, the apprenticeship system, and the training given for these trades in the public school. The commission recommends the establishment of a trade school for girls.

EDNA BRYNER. *The Garment Trades.* Cleveland: The Survey Committee of the Cleveland Foundation, 1916. Pp. 153. Twenty-five cents.

The report sets forth the history of the garment trades, describes what the workers do, who they are, what they earn, the regularity of their employment, training and promotion in the industry, and the educational needs of the garment workers. The sewing trades offer the largest industrial opportunity for girls in Cleveland. Many of these girls go to work before completing the compulsory attendance period. A better enforcement of the attendance laws, the reduction of retardation, and the reorganization of the work of the junior high schools are recommended by the survey. The establishment of a trade school for girls is strongly urged.

SAMUEL PAUL CAPEN. *Recent Movements in College and University Administration.* Bulletin, 1916, No. 46. Washington: Bureau of Education, 1917. Pp. 60. Ten cents.

This bulletin gives summaries of the surveys conducted by the Bureau of Education in Iowa, Washington and North Dakota, and excerpts from reports on the College of the City of New York, Smith College and Miami University. There is further a discussion of college entrance requirements, of teachers' pensions, and of various cases involving academic freedom.

The Case of the Julia Richman High School. New York: Public Education Association, 1917. Part I, pp. 20. Part II, pp. 12.

These bulletins set forth an earnest and vigorous plea for the construction of a building to house the seven branches of the school now

scattered over New York City from City Hall to Central Park. They give a good idea of what the girls are now doing and of how much more they might accomplish if they had adequate quarters.

S. A. COURTIS. *Third, Fourth and Fifth Annual Accountings, 1913–1916. and Summary of Tabulations.* Detroit: Department of Coöpative Research, 1916. Pp. 111. Fifty cents.

The interest in the Courtis Standard Tests grows apace. The number of copies sold last year rose well above the half-million mark and went to almost every state in the Union. The tests in English and geometry have been discontinued in their original form and special tests in reading, writing, and composition will be issued this year. We find in the report an important discussion of standards of speed and of accuracy, and the tables of distribution of the class medians furnish valuable material for comparison. Mr. Courtis has also issued a new supervisory graph for series B and a new form of record sheet.

JOHN DEWEY, and others. *Creative Intelligence. Essays in the Pragmatic Attitude.* New York: Henry Holt and Company, 1917. Pp. v, 467. Two dollars.

This is a coöperative attempt to treat from a common point of view a variety of intellectual problems. These problems lie in the domains of philosophy, logic, mathematics, physical science, psychology, ethics, economics, esthetics, and religion. "The significant points of agreement have to do with the ideas of the genuineness of the future, of intelligence as the organ for determining the quality of that future so far as it can come within human control, and of a courageously inventive individual as the bearer of a creatively employed mind." The eight papers which make up the volume are as follows: *The Need for a Recovery of Philosophy*, by John Dewey; *Reformation of Logic*, by Addison W. Moore; *Intelligence and Mathematics*, by Harold Chapman Brown; *Scientific Methods and Individual Thinker*, by George H. Mead; *Consciousness and Psychology*, by Boyd H. Bode; *The Phases of the Economic Interest*, by Henry Waldgrave Stuart; *The Moral Life and the Construction of Values and Standards*, by James Hayden Tufts; *Value and Existence in Philosophy, Art, and Religion*, by Horace M. Kallen. The book sets forth the pragmatic point of view in philosophical questions somewhat as a similar work by seven realists did a few years ago for neo-realism.

AUBREY AUGUSTUS DOUGLASS. *The Junior High School.* Fifteenth Year Book of the National Society for the Study of Education, Part III. Bloomington, Illinois: The Public School Publishing Company, 1916. Pp. 157. Seventy-five cents.

The first chapter of this monograph includes a brief history of the junior high school movement, arguments for and against it, its cost and its present extent. Chapter Two considers the physiological

and psychological characteristics of adolescence and the arguments for and against a special school organization for, and treatment of, the early adolescent. The author thinks there is justification for such a differentiation, although there is such great variability in the chronological age at which pupils arrive at maturity that even if the saltatory theory of mental development is held, methods of instruction should not be radically changed. Chapter Three develops the curriculum of the junior high school, considers typical junior high school curricula and comments on the advantages of the various plans. Chapter Four discusses such administrative problems as the grouping of grades, housing, relation to colleges, securing of teachers, supervised study and the elimination and retardation of pupils. There is a bibliography of twelve pages.

CHARLES REDWAY DRYER. *Elementary Economic Geography.* Cincinnati: American Book Company, 1916. Pp. 415.

This is a fascinating text on the earth and its productivity in relation to man. The first eight chapters, part one, give a survey of human economics and their foundations in nature, while part two deals with the economic geography of the United States. There are numerous maps, diagrams and illustrations that enhance the attractiveness of the test.

CHARLES WILLIAM ELIOT AND ERNESTO NELSON. *Needed Changes in Secondary Education.* Two papers presented at the Pan-American Scientific Congress, Washington, D. C., December 27, 1915. Bulletin, 1916, No. 10. Washington: Bureau of Education, 1916. Pp. 32. Five cents.

The first of these papers, which gives the title to the monograph, has already been issued as an occasional paper by the General Education Board. The paper by Dr. Nelson, who is Director of Secondary Education in Argentina, is on the Secondary School and the University.

JOHN E. EVANS. *The Effect of Distraction on Reaction Time, with Special Reference to Practice and the Transfer of Training.* Archives of Psychology, No. 37, November, 1916. Pp. iii, 106. $1.00.

This is a curious and rare instance of an American scientific monograph without table of contents, index or other means of orientation. If the hard pressed reviewer will take the trouble to cut the leaves and examine each in detail he will not find the argument difficult to follow, but it is somewhat remarkable that such an elaborate study should be issued without any of the ordinary aids to orientation. Our interest naturally centers in the transfer of training, and the author finds that the ability gained by long practice in simple reaction to one stimulus seems to be transferred bodily when reactions are made

to another stimulus. Practice in reacting to a particular stimulus with a particular distraction aids in reacting to a new stimulus with the same distraction, or to the same stimulus but with different distractions. The subject acquires definite adjustments to the constant conditions of his work. Useless reactions are repressed early in the practice period. Along with this comes a feeling of self confidence and self reliance which stimulate the subject to active interest in the work, and make transfer possible. This ability to ignore the unessential and to subordinate the minor to the major elements of the situation is synonymous with good attention.

SIGMUND FREUD. *Leonardo Da Vinci.* New York: Moffat, Yard and Company, 1916. Pp. 130. $1.25.

The sub-title of this book is "A Psycho-Sexual Study of an Infantile Reminiscence," and the author works out in great detail and with characteristic ingenuity a theory to account for some of the peculiarities of this great artist and scientist. Taking as a text a casual reference to a childhood memory of a vulture coming down and striking the boy him on the lips, the author builds up an elaborate structure of sexual attitudes to account for both the strength and the weaknesses of the artist's character.

JOSIAH B. GAME. *Teaching High School Latin.* Chicago: University of Chicago Press, 1916. Pp. ix, 125. $1.00.

The author has endeavored to prepare a practical manual that will meet some of the immediate needs of the young teacher of Latin. Among the topics considered are the significance of Latin in education and in life, classical studies on the defensive, the training of the Latin teacher, English in Latin study, a detailed consideration of the Latin study in each of the four high school years, Latin prose composition, and the classroom equipment for the Latin department. Every Latin teacher should be well acquainted with the contents of this book.

MELVIN E. HAGGERTY, Editor. *Studies in Arithmetic.* Indiana University Studies No. 32, September, 1916. Pp. 110. Twenty-five cents.

In this bulletin Professor Haggerty gives a second report on the use of the Courtis Test, Series B, in twenty-two Indiana cities, Mr. Paul R. Mort reports on the use of the same tests in the rural schools of five counties, Miss Mary A. Kerr on the effects of six weeks daily drill in addition, Mr. Herman Wimmer on the effects of drill in both fundamentals and reasoning as measured by the Courtis Tests, Series Series A, and Miss Flora Wilber reports experiments with the Courtis Practice Pads. In the comparison of drill for speed with drill for accuracy the speed group showed the greater gain in all respects when accuracy alone was considered.

LUDOVIC HALEVY. *L'Abbé Constantin.* Edited with notes by Victor E. Francois. Cincinnati: The American Book Company, 1917. Pp. 285.

An interesting story for second or third year French. The text is richly illustrated with quaint old-fashioned pictures.

G. V. HAMILTON. *A Study of Perseverance Reactions in Primates and Rodents.* Behavior Monographs, Volume III, No. 2, 1916. Pp. iv, 65. Seventy-five cents.

This is a continuation of the author's previous study of choice reactions in escaping from an enclosure. The present study was made on one mouse, five gray rats, four black rats, eight white rats, six gophers, four monkeys, one baboon and twenty girls, the latter ranging in age from three to twelve years. The author analyzes the responses into five different types. In regularity and system of attacking the problem the girls stand first, followed by the monkeys and the white rats. The author finds that a response which has been frequently manifested with invariable advantage is more apt to recur in the behavior of the individual than is a still more frequently manifested response which has not brought invariable advantage. As we descend in the phyletic scale the factor of recency seems to increase in importance as a determinant of habit formation, whilst that of frequency relatively decreases.

JAMES H. HARRIS AND H. W. ANDERSON. *Measuring Primary Reading in the Dubuque Schools.* Dubuque, Iowa, 1916. Pp. 23.

This is a report on an experiment to determine the relative values of three different systems of teaching reading. The tests used were the Courtis reading tests for silent reading, and for oral reading the Gray standardized reading paragraphs as used in the Cleveland Survey. There was a decided advantage in favor of one of the systems and this according to the authors was due not to the superiority of the teaching but to that of the methods used. It furnishes a good illustration of how standard measurements may be employed to help solve practical problems of school administration.

JAMES H. HARRIS AND H. W. ANDERSON. *A Study of Handwriting in the Public Schools of Dubuque, Iowa.* Dubuque: Bureau of School Measurements, 1916.

The pamphlet gives an account of the use of the Ayres Handwriting Scale to determine how the pupils of the Dubuque Schools compared with those in other cities. Tables of individual differences and grade differences for both speed and quality are presented, and a comparison is made between the showings in February and June of the same year. The comparison showed a distinct loss in speed in every grade and a slight gain in quality in perhaps half of the grades. The authors claim, however, that the gain in quality is not sufficient to justify the great loss in speed.

ARTHUR W. KALLOM. *English. Determining a Standard in Accurate Copying.* Boston: Department of Educational Investigation and Measurement, Bulletin No. 6, 1916. Pp. 25.

A printed paragraph of simple prose was assigned to be copied by over four thousand first year pupils in Boston high schools. The errors were tabulated according to spelling, capitalization, omitted words, added words, words wrongly used, misplaced words, punctuation, undotted "i's," uncrossed "t's." There is a detailed study of the distribution of errors according to sex, according to the lines written, and according to age. The highest number of errors was found in omitting the dot from the "i," next came errors of punctuation, and errors of spelling made a close third. The girls copied three per cent. more than the boys in the time allowed, and made 66 per cent. fewer errors. Every word in the selection was misspelled by some pupil. Children who wrote fewer lines made relatively as many errors as others. There was little relation between age and ability to copy.

W. E. MACPHERSON. *The Ontario Grammar Schools.* Bulletin of the Departments of History and Political and Economical Science in Queens University, Kingston, Ontario, No. 21. October, 1916. Pp. 22.

An interesting historical sketch of the development of secondary schools in Ontario.

National Society for the Study of Education, Sixteenth Yearbook. Part I. Bloomington, Illinois: Public School Publishing Company, 1917. Pp. 204. Ninety cents.

This yearbook contains the second report of the committee on minimum essentials in elementary school subjects. The first report of this committee appeared in Part I of the Fourteenth Yearbook of the Society. Among the papers to be found in the present volume are *The Relation of Silent Reading to Economy in Education,* by William S. Gray; *Handwriting,* by Frank N. Freeman; *A Suggested Minimal Spelling List,* by Hugh Clark Prior; *Minimal Essentials in Elementary Language and Grammar,* by W. W. Charters; *Economy of Time in Arithmetic,* by Walter S. Monroe; *The Social and Business Use of Arithmetic,* by G. M. Wilson; *United States History as Taught in the Seventh and Eighth Grades,* by W. C. Bagley; *Possible Defects in the Present Content of American History as Taught in the Schools,* by Ernest Horn; *A Scale for Measuring Results of Physical Education,* by Louis W. Rapeer. Many of these studies present new experimental material and are worthy of careful consideration.

CLARA A. PEASE. *A First Year Course in General Science.* New York: Charles E. Merrill Company, 1915. Pp. 315.

In attacking the subject of science this author begins with the consideration of the heavenly bodies, particularly the sun, moon and planets. There follow chapters on matter, force, heat, liquids, gases,

the weather, light, electricity, minerals, soil, mountains, earthquakes, rivers, glaciers, and the discussion concludes with five chapters on living substance as exemplified in plants and animals. The book also has bound with it a forty-page laboratory manual.

HARRY BRADLEY SMITH. *Establishing Industrial Schools.* Boston: Houghton Mifflin Company, Riverside Educational Monographs, 1916. Pp. xxiv, 167.

The author first considers the problems arising in connection with selecting the type of school for the community. The study of the industries of the community, the number of young people employed, opportunity for advancement in the trade, and allied industries should be carefully considered. This calls for an industrial and educational survey of the community, for making which detailed plans are furnished. Then comes the problem of selecting the course of study. This selection will depend largely on the needs of the community as indicated by the survey, and by the facilities and equipment which the school has at its command. Finally, there is an interesting series of comments on the hap-hazard way in which teachers have often been selected, and on the criteria of a desirable teacher. The author is strongly convinced of the efficacy and beneficent influence of industrial schools, though he has little to say about the cost of their maintenance.

LORLE IDA STECHER. *The Effect of Humidity on Nervousness and on General Efficiency.* Archives of Psychology, No. 38. December, 1916. Pp. v, 94. Ninety cents.

This is a part of the extensive study of the subject of ventilation carried out by the New York State Commission on Ventilation. Almost one-third of the monograph is devoted to a history of investigations of the effect of indoor and outdoor atmospheric conditions. Experiments were made with twenty-nine subjects under various conditions of humidity on accuracy of movement, speed of tapping, speed and accuracy in aiming, typewriting, mirror tracing, hand and arm steadiness, addition, and mental multiplication. The results of the experiments were entirely negative, for experimental humidity conditions considerably more rigorous than those obtaining in any artificially heated apartment produce no demonstrable effect in behavior.

ALBERT AUGUSTUS TREVER. *A History of Greek Economic Thought.* Chicago: University of Chicago Press, 1916. Pp. 162. Seventy-five cents.

A detailed analysis of the writings of Plato, Xenophon, Aristotle, and other Greek thinkers on the subject of economic theory. The book is a striking re-interpretation of Greek economic thought in the light of modern humanitarian economy. The author brings out the remarkable fact that the Greeks were the forerunners of the moral, humanitarian and social emphasis in present day economy. It is an extremely interesting and stimulating study.